FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 80 Thursday, October 3, 1946 No. 1572

49, Wellington Street, London, W.C.2
'Grams : " Zacatecas, Rand, London "
'Phone : Temple Bar 3951 (Private Branch Exchange)
PUBLISHED WEEKLY : 21s. per annum (Home and Overseas)

Simulated Service Tests

Visits which we have made to some mass-production factories, have left us with the impression that their research laboratories make but a meagre contribution to fundamental knowledge, as the whole of their activities have been devoted towards the ascertainment and improvement of the life of the components used in the construction of the machines. A typical instance is that of the simulation of the movements given to an electric iron when in use, and thereby determining the life of the flex connected to it. Similarly, every component of a modern vacuum cleaner is constantly being evaluated. By such methods, information is gained as to where weaknesses exist, and conversely where satisfaction can be relied upon. Obviously, this type of testing could be prostituted to increase the sales of spare parts. It could, for instance, enable the makers of electric light bulbs to limit the effective life of their product to, say, 1,000 hours—no more and no less. Such an action would not be helpful, unless a suitable guarantee accompanied all sales. This type of action would make real use of simulated tests, but a still better move would be the safeguard of embodying such data in standard specifications.

Apologising for taking our argument from the particular to the general, we do so as we understand from American sources that in the States there is a movement towards " increasingly using [in A.S.T.M. specifications] simulated service tests, especially on finished parts or product assemblies, rather than completely depending on standardised tensile or fatigue or impact tests made on bars of the raw material before processing or fabrication." This is a quotation from a leading article by Mr. Fred P. Peters in " Materials and Methods." Part of his argument in support of this tendency is as follows:

" Some of the better-known properties of materials and their required tests that have been standard bases for materials-selection for years are now regarded with a cold and fishy eye by smart materials engineers and metallurgists. To these more enlightened brethren, for example, good ductility is considered a valid criterion of suitability-for-use only if it is actually required in the specified service to which the material is to be put. If the service involves no plastic deformation then a ductility requirement is irrelevant, and materials with something approaching zero elongation may, for entirely different reasons, be better for the particular service involved than those with 20 or 30 per cent. elongation. With this common-sense engineering philosophy some of our oldest prejudices about materials (*e.g.*, against cast iron, just because its lacks ductility) are rapidly vanishing."

The argument is reinforced by the reference to the increasing use of composite materials, *e.g.*, laminated sheets and the like, which form part of mechanical components, and which materials, when built into assemblies, behave differently from that which can be deduced from testing in an earlier state.

Obviously, before simulated service tests can be introduced in specifications, data must be forthcoming and we incline to the view that insufficient work, as compared with some competing industries, is being done in foundry concerns, especially those making finished articles.

MR. H. LINDSAY, in the Imperial Institute Annual Report (p. 33, 1945), reports that no market has yet been found for bentonitic clays and soapstone from Kenya. Larger samples, however, are to be obtained so that trials can be made on an industrial scale.

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FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

OCTOBER 7.

Society of Chemical Industry (London section) :—"Chemical Research and Corrosion Control: Some Recent Contributions of a Corrosion Research Group." At the Chemical Society, Burlington House, Piccadilly, London, W.1, at 6.30 p.m.

Association of Bronze and Brass Founders (Yorkshire area) :—Informal meeting. At the Great Northern Hotel, Leeds, at 12.45 p.m.

OCTOBER 10.

Institute of Metals (London local section) :—"The Purple Alloy of Gold and Aluminium," by Dr. J. H. Watson. At 4, Grosvenor Gardens, London, S.W.1, at 7 p.m.

Institute of Welding (Sheffield and District branch) :—"Oxy-acetylene Welding and Cutting." At the Royal Victoria Station Hotel, Sheffield, at 6.30 p.m.

OCTOBER 11.

Manchester Association of Engineers :—Inaugural address: "Operation Pluto." At the Engineers' Club, 17, Albert Square, Manchester, at 6.45 p.m.

OCTOBER 15.

Sheffield Metallurgical Association :—"Overheating Symposium." At the Metallurgical Club, West Street, at 6.30 p.m.

Institute of British Foundrymen

OCTOBER 5.

East Midlands branch :—Visit to Staveley Coal & Iron Company, Limited. Presidential address by Mr. J. Roxburgh.

Lancashire branch :—"Cupola Operation," by Mr. D. H. Young. At the College of Technology, Sackville Street, Manchester, at 3 p.m.

Lincoln section :—Visit to M.O.S. Steel Foundry, F. H. Lloyd & Company, Limited, Burton-on-Trent. Presidential address by Mr. R. C. Shepherd. At Lincoln Technical College, at 7.15 p.m.

OCTOBER 7.

Lincoln section :—Film: "The Production of High Quality Steel," presented by Mr. W. H. Salmon, Assoc.Met., F.I.M. Joint meeting with the Newark Eng. Society at the Newark Technical College at 7.30 p.m.

OCTOBER 10.

East Anglian section :—Visit to Suffolk Iron Foundry (1920), Limited, Stowmarket, at 2.45 p.m.

OCTOBER 12.

West Riding of Yorkshire branch :—Presidential address. "Parablast Cupola," by Mr. H. Taft. At 1, Mannville Terrace, Bradford, at 5 p.m.

Burnley section :—Film: "The Production of High Quality Steel," followed by discussion. At the Accrington Technical School, Accrington, at 6.30 p.m.

Scottish branch :—Presidential address. "The Influence of Design and Pattern-making on Foundry Technique, and the Development of Competitive Methods of Production of High Duty Castings," by Mr. T. H. Sneddon. At the Royal Technical College, Glasgow, at 3 p.m.

OCTOBER 14.

Sheffield branch :—Discussion of "The Manufacture of 'Grand Slam' Bombs." At the Royal Victoria Station Hotel, Sheffield, at 7.30 p.m.

OCTOBER 15.

Slough section :—Film: "Subjects of Foundry and Allied Interests." At Lecture Theatre, High Duty Alloys, Trading Estate, Slough.

BOOK REVIEWS

Costing in the Engineering Industry, by F. R. Goody. Published by Emmott & Company, Limited, 31, King Street West, Manchester, 3. Price 2s. 6d.

In this very practical little book, the author has managed in nine chapters to outline what appears to the reviewer to be a thoroughly practical scheme of costing for an engineering company undertaking repetition work.

V. C. F.

Installation and Care of Electric Power Plant, by "Engineer-in-Charge." Published by Emmott & Company, Limited, 31, King Street West, Manchester, 3. Price 3s. 6d.

The reviewer is aware of several cases where foundry managers have thrust upon them the onus of the responsibility of the maintenance of the work's private water supply, and it can be assumed that some will be saddled with the maintenance of the electrical plant. If this be so they will find this little book quite useful. It covers such plant as transformers, motors and starters, and portable electric tools.

Technique for the Gas Welding of Magnesium Alloys. Published by the British Welding Research Association, 29, Park Crescent, London, W.1. Price 2s. net.

This 38-page well-illustrated booklet has left the reviewer with the impression that the nature of the flame is now established; the flux problem has been stated, but no solution given; the welding rods are to be of similar composition to the alloy being welded, and that structures should not be welded at bends or by the depositing of runs along laps. It is obvious from reading between the lines that the welding of magnesium can scarcely be said to have general application, but rather is it restricted to a few concerns which have the "know-how."

V. C. F.

A CORRECTED REPORT

Mr. J. Blakiston, A.M.I.Mech.E., states that he has been misreported on page 94 of last week's issue of the FOUNDRY TRADE JOURNAL. A better rendering of his remarks would read:—"About 50 years ago, during the development of the manufacture of Bessemer steel, hot-blast cupola practice was common both on the North-East coast and in South Wales. Originally the blast was heated by means of U-tubes to a temperature of 500 deg. C., and later by means of Cowper stoves to a much higher temperature, resulting in a coke consumption of approximately 1¼ cwt. per ton, utilising blast at 3 lb. pressure." We regret any annoyance caused to Mr. Blakiston.

THE ENGLISH ELECTRIC COMPANY, LIMITED have acquired a country mansion at Grange-over-Sands for use as a convalescent home for their employees.

FUEL EFFICIENCY IN THE BRASS-FOUNDRY PAYS DIVIDENDS*

By G. L. HARBACH† and F. HUDSON, F.I.M.‡

Introduction

This Paper has been prepared on behalf of the Association of Bronze and Brass Founders at the request of the Ministry of Fuel and Power. It is intended to review the early work of the Association and the results achieved in connection with fuel economy; to provide comparative data on coke and oil fuel melting, and to give examples of further economies which may be adopted more generally in the future.

Formation of A.B.B.F. and the Technical Committee

The primary reason for the formation of the A.B.B.F. in 1942, was the urgent need to save fuel. The committees, sponsored by the Ministry of Fuel and Power, required representation of the industry by a national body capable of devising means of effecting fuel economy in the foundries concerned.

Prior to this period founders of bronze and brass had no national organisation to deal with their special interests, but the records of the past four years and the increasing membership are evidence of the advantages of the Association, both to individual members and the industry as a whole.

A technical committee was formed from non-ferrous foundrymen and metallurgists who were all prepared to pool their knowledge and experience for the general benefit of members. The field of interest and usefulness quickly proved to be far wider than the original object of fuel economy, as shown by the recently published report (FOUNDRY TRADE JOURNAL, July 18, 1946) and the number of members who have been assisted in solving many technical problems.

Summary Provides Yardstick

Up to 1942 reasonable fuel consumptions for different foundry processes were largely unknown; most firms knew something of the fuel used as a whole, some had detailed information, but few knew how their results compared with others working under similar conditions—a yardstick was necessary to determine fuel efficiency.

The first work of the technical committee was to circularise all members with a comprehensive questionnaire and summarise their replies. The data obtained were tabulated to show:—

(1) Firm's reference number.
(2) Output in tons.
(3) Different fuels all calculated to "tons coal equivalent" on a thermal basis.
(4) Types and capacities of furnaces.
(5) Types of castings produced—green sand, dry sand, centrifugal, chill, etc.
(6) The proportion of the various alloys cast.
(7) Fuel used per ton output.

Copies of the summary, which covered a complete cross-section of the industry, were sent to each member, together with comparative statistics in cases where the ratio of fuel to output differed widely although conditions were similar. By this means each firm could determine its own yardstick, by comparing results with others engaged in similar work, and take steps to explore the causes and effect reductions where fuel consumption was high. The results were gratifying in that the Association's quarterly returns showed considerable fuel savings.

Reports to Ministry of Fuel and Power

The Ministry required progress reports in a more condensed form than the summary and, while the varying manufacturing conditions naturally associated with any branch of the foundry industry caused the "fuel used per ton output" to differ widely, the fuel consumption figures fell broadly into three groups: Green sand, dry sand, and remainder. At the request of the Ministry, the Association also compiled statistics for the billet and ingot producers and the data from this section proved very useful as they provided a further group, the fuel consumption of which was almost entirely devoted to melting. (See Table I.)

TABLE I.—*Fuel Consumption—Various Processes.*
Tons coal equivalent per ton produced.

Group No.	Production	Range	Average
1	Billets and ingots	0·15 to 0.52	0.301
2	Over 70 per cent. green sand castings	0.42 to 1.85	0.900
3	Over 70 per cent. dry sand castings	0.49 to 2.46	1.44
4	Mixed (not in Groups 2 or 3)..	0.20 to 4.30	0.866
2, 3 and 4	Combined	—	0.906

NOTE.—Group 4 included a wide variety of products and processes, some using very little fuel, others using much above the average, as indicated by the wide range.

The comparative results of the records of the first two years were issued to members and the Ministry, as a condensed summary under the four group headings shown in the Table.

Each member could see at a glance his position in the group, and any change which had occurred during the year while the Ministry officials had a ready means of judging the situation as a whole.

* A Paper to be presented at the forthcoming conference on Fuel and the Future, organised by the Ministry of Fuel and Power.

† Chief metallurgist, Worthington-Simpson, Limited.
‡ Development and Research Department, The Mond Nickel Company, Limited.

Fuel Efficiency in the Brassfoundry

Fuel Savings Effected

The work of the technical committee provided the industry with new knowledge and, by its practical application, considerable fuel savings were effected as shown by the following report of the Association for 1942-43.

"*Billet and Ingot Makers.*—For 27 firms the specific fuel consumption ton/ton was reduced from 0.301 to 0.295, a fuel saving of 2 per cent. or 411 tons for the 27 firms; 15 firms showed decreases, six firms claimed over 15 per cent. reduction.

"*Bronze and Brass Castings (three groups combined).*—For the 51 firms making returns in both years the specific fuel consumption ton/ton was reduced from 0.906 to 0.862, representing a 4.4 per cent. saving, calculated to be 2,500 tons per annum; 36 firms showed decreases, 11 firms claimed 25 per cent. or more."

Further savings in fuel were reflected in the returns for 1944.

Summing up this section of the Paper, it is felt that the "yardsticks" produced for the various processes, combined with advice and propaganda, not only resulted in a reduction of both fuel and costs, but achieved a worth-while lasting benefit to individual firms and to the industry as a whole.

Fuel Saving Methods Reviewed

The means whereby fuel saving was accomplished had wide publicity in 1942-43; however, the following points are worth repetition, because the urgent needs of war production frequently prevented all the possible economies being effected at the time, and where they were achieved there may have been a falling off since, through lack of interest.

The working programme should arrange that:—

(1) Moulds be completed when the metal is ready to pour—"stewing" spoils good metal apart from fuel wastage.

(2) The minimum number of furnaces be used each day.

(3) Each heat to be as near maximum capacity as possible.

(4) Crucibles below normal size for a furnace are not used.

(5) Pre-ingotting of virgin metals to be avoided.

The success or failure of any fuel saving scheme ultimately depends on the operator. The Authors, satisfied from personal experience, that evidence of interest in a man's job and the result he achieves is the best means of ensuring intelligent co-operation, recommend the following addition:—

(6) All operators using fuel should be made aware of:—

(*a*) The necessity to use fuel with care.

(*b*) That the management are interested in the results.

The scope for future fuel economy may be judged from the facts that earlier efforts were limited by the urgency of war needs, and the restrictions on new plant and choice of fuel. With the knowledge previously gained applied to old plant, the installation of highly efficient fuel burning equipment which is now practicable, and the availability of oil fuel to replace coke, the following examples show that further savings on a wide scale are now possible.

Oil Fuel Compared with Coke

It has been recommended officially that oil fuel should be used where possible in place of solid fuel. Here it must be stated that oil fuel does not necessarily mean creosote pitch and disappointed users of this form of fuel—and not all are anxious to revert to coke firing—may still consider the official recommendation with advantage.

Potential users will naturally wish to know how the change will work out and, with this end in view, a review of the summary was made to extract the fuel consumptions of oil fuel users. The results are given in Table II from which it will be seen that firms using oil were, on a thermal basis, more economical than those using coke.

TABLE II.—*Consumption and Cost of Coke and Oil Compared.*

Production	Fuel Per Ton Produced				
	Coke Actual Ton	Oil C.E.* Ton	Oil Actual Ton	Cost†	
				Coke	Oil
Billets and ingots ..	0.31	0.25	0.175	25s. 10d.	34s. 6d.
Green sand castings..	1.01	0.625	0.428	84s.	84s. 6d.

* Coal equivalent—coke 280 therms per ton, oil 400 therms per ton.
† Based on coke at 83s. per ton, and Diesel type oil at 9½d. per gallon of 8½ lb.

On a thermal balance 0.7 ton of oil equals 1 ton of coke, but the unit cost of oil is approximately 2½ times that of coke, so, for the same outlay on fuel, roughly 0.4 ton of oil should give the production of 1 ton of coke. The billet and ingot group show a 33 per cent. increase in cost but the efficiency in the green sand casting group was sufficiently high to offset the higher cost of oil. In the other groups there were insufficient oil users to make a comparison.

However, cost as delivered is not the sole criterion on which oil fuel should be judged when compared with coke; general convenience in storage and handling from truck to furnace, no ash disposal and a cleaner furnace all decrease labour costs; and economies are effected by no discard in ashes and "smalls," and quicker melting, particularly for high temperature metals. All these factors favour the use of oil and it is significant that users of oil fuel evince no desire to return to coke.

Actual Examples of Foundry Dividends

It is obvious that the benefits gained, from the more efficient use of fuel, by the non-ferrous foundry industry as a whole have been obtained as a result of the work done by individual foundries. During the war patriotism may have been the incentive, but to-day the progressive foundryman appreciates that fuel efficiency is an integral part of a well-run business and when

intelligently applied is capable of returning substantial dividends. Circumstances do not permit the giving of many examples of such dividends but it may be of interest to outline the results obtained by two foundries:—

(A) Due to making the best use of existing melting equipment, and (B) due to the installation of new mould- and core-drying ovens.

These examples have been selected in view of the fact that the bulk of the fuel employed centres around these operations and they are common to all foundries large and small.

Dividends Due to Making the Best Use of Existing Melting Equipment

Foundry A operates batteries of natural and forced draught coke-fired crucible furnaces of both the pit and tilting type for the production of bronze and brass castings to meet general engineering requirements. Their equipment and products are similar to those of other foundries throughout the country although their production may be greater than many. The following is an extract from their cost accountant's report:—

> Our standard allowed cost of fuel for melting has not been altered since January, 1942, and since our fuel account shows that the amount of fuel used is still less than the amount allowed, we see no reason for altering our standard. This means, of course, that all the price increases for fuel which have occurred since January, 1942, have been absorbed as a result of efficient operation. The following figures will show quite clearly what has happened.

Year	Standard Allowed Cost for Fuel	Actual Cost of Fuel	Saving
	£	£	£
1942-43	14,197	12,127	2,070
1943-44	14,595	11,064	3,531
1944-45	12,001	11,423	578
1945-46 (8 months to date)	7,516	7,464	52

While the saving has been falling, except for the year 1943-44, it must be remembered that we are still operating on the standard fixed for January, 1942. Since January, 1942, the basic price of fuel has increased by 31.875 per cent., so that if we bring the period for the last eight months into line with the price increases we should have:—

Standard allowed cost for fuel ...	£9,912
Actual cost of fuel	£7,464
Saving	£2,448

which in the full year provides a saving of £3,672 or £1,600 above that shown for the period 1942-43. In other words, if it were not for our fuel economy campaign, we should expect to have £1,600 greater expense on fuel in the year 1945-46, than actually is the case.

This dividend has been achieved along the usual lines with one very important exception. We have allowed our furnacemen to finish work and go home when the last mould has been poured. Departments have been encouraged to arrange their work so that this can be achieved at the earliest possible moment of the day. The result has been that although the volume of tonnage moulded has been satisfactorily maintained, the furnacemen have been working something like 30 to 36 hrs. per week instead of 47. Since, however, they are paid on a piecework basis, this has not affected their earnings but the effect upon fuel economy can be appreciated.

The fact that the company includes in its cost accounts, fuel at a standard set in January, 1942, and is operating from this basis, shows how satisfactory the position is, since obviously we should not form selling prices based upon overhead figures which would show us a loss.

Dividends Due to the Installation of New Mould- and Core-drying Ovens

Foundry B used to employ old-fashioned horizontal ovens for baking two batches of oil-sand cores per day. It was decided to instal a modern type of vertical continuous stove and the following results were obtained:

	Using Old Batch Type Stoves	Using Modern Vertical Continuous Stove (No. 2 Acme Junior)
Oils and cores baked per day	3,200 lb.	7,000 lb.
Fuel used per day (coke) ..	672 lb.	280 lb.
Period in operation ..	Two batches 11 a.m. to 1 p.m. and 5 p.m. to 7 p.m.	Continuously 6.30 a.m. to 7.30 p.m.
Fuel consumed per hour ..	168 lb.	22 lb.

In other words, one modern drying unit provided a daily output of baked cores equal to the production of two obsolete batch type stoves with an approximate saving of just over half a ton of coke per day.

It is interesting to note that oil can be successfully employed for firing mould- and core-drying stoves, and Fig. 1 illustrates such a unit recently installed in a large foundry in the Midlands. It is claimed that between five and seven tons of oil sand cores can be baked per hour at 425 to 430 deg. F. (218 to 221) deg. C.) on this installation with the consumption of four to five galls. of light oil (Diesel) which gives a maximum fuel cost of around 10d. per ton of dried cores. It should be noted that this stove was specially designed for oil-firing with the result that a high efficiency has been obtained. Conversions, or the use of higher operating temperatures, are not so economical and it might be of interest to mention that a stove of similar size and output to that outlined above converted from coke- to oil-firing and operating at 500 to 510 deg. F. (260 to 265 deg. C.) required 10 galls. of oil per hour. With oil-firing there is need for careful burner control otherwise oil is wasted and the surface of the cores becomes covered with soot.

It is appreciated that the examples just given relative to modern methods of drying cores apply to foundries

Fuel Efficiency in the Brassfoundry

with a large output, but it should be recognised that miniature editions of the above plant are now available for the small brassfoundry. A vertical continuous core stove has recently been designed measuring 12 ft. 6 in. high, by 5 ft. by 4 ft. 5 in., to meet the needs of the small core shop. This stove is gas heated and fitted with automatic temperature control, and, while its fuel efficiency will be somewhat less than the larger units previously outlined, it will permit of very substantial fuel savings over the numerous old-fashioned and obsolete equipment still in service.

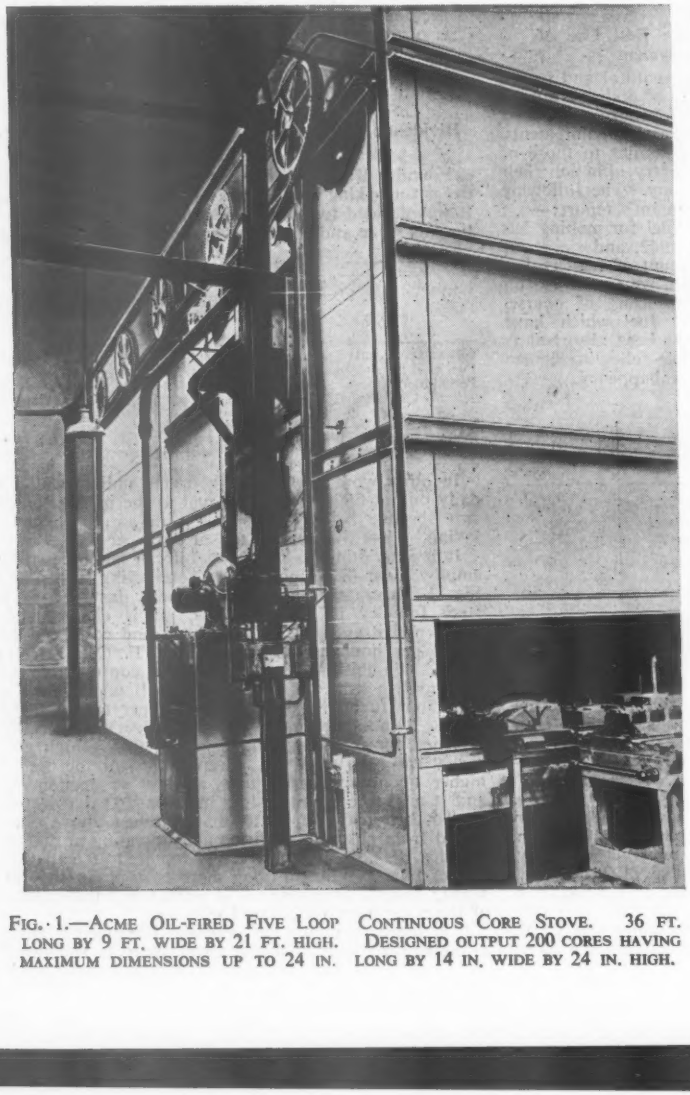

FIG. 1.—ACME OIL-FIRED FIVE LOOP CONTINUOUS CORE STOVE. 36 FT. LONG BY 9 FT. WIDE BY 21 FT. HIGH. DESIGNED OUTPUT 200 CORES HAVING MAXIMUM DIMENSIONS UP TO 24 IN. LONG BY 14 IN. WIDE BY 24 IN. HIGH.

Conclusions

In the past fuel has been cheap and regard has been casual in consequence; present-day costs, having brought it more into line with its importance as a major national asset, make the wise use of fuel imperative. Under wartime impetus great strides were made within the limitations of that period, but restrictions on choice of fuel and the installation of new equipment are now easier, and improved efficiency and further economies can still accrue from thoughtful and active consideration by foundry executives, coupled with co-operation and interest in the operator's efforts.

Fuel saving and the use of modern economical plant are frequently accompanied by labour saving—both of considerable national importance to production in all its branches—and, as castings are the raw material for engineers and their products form a large proportion of our exports, every improvement in fuel efficiency improves the national position.

As a country dependent on exports to maintain its standard of living, Britain is in competition with other countries which have developed a high state of industrial efficiency and, unless this country too reaches a similar high standard, it will fail to retain a leading position. The efficient use of fuel in the foundry industry may seem a small item, nevertheless, it adds its quota to the whole, and fuel economy not only pays dividends in brassfoundries but, as a factor in the overall efficiency necessary for the country's welfare, it pays national dividends too.

Acknowledgments. — The Authors are indebted to the firms who kindly supplied the data for the examples quoted, and to the Foundry & Engineering Company (West Bromwich), Limited, for the illustration of the Acme core stove.

PATTERNS FOR A PRODUCTION FOUNDRY*

By G. A. Pealer.

Most pattern-makers have had, at one time or another, the desire to extend a pad to a wall to eliminate a loose piece, or add a larger fillet to reduce possible casting shrink or strain crack. However, far too many pattern-makers blindly make the pattern to the drawing, with the self-righteous, smug thought that the pattern is to the drawing, regardless of the fact that it is a poor pattern entailing a high moulding cost.

It should be emphasised that a good engineer will thank the pattern-maker for saving money or making a better, less costly, casting possible.

Competitive cost operates not only in the pattern shop, but in the foundry as well. The cost of the pattern in most cases, and certainly in production work, is a small item in the overall cost picture. Therefore, a pattern equipment which will mould readily and with the foundry equipment on hand must be designed if at all possible—a factor prone to be overlooked. As an illustration: A customer sends a drawing to several shops, asking for quotations on equipment to produce 200 castings.

Shop No. 1 quotes $25 for a single, one-piece pattern.

Shop No. 2, noting that the pattern can be split, quotes $35 for a two-wood pattern.

Shop No. 3, noting that 200 castings are wanted, checks the foundry for flask sizes on hand in the pattern range, and quotes $65 for a hard-wood matchboard of one pattern to fit a certain flask and, upon inquiry, finds that the casting is to be a repeat number. Shop No. 3 also quotes $165 for an aluminium matchplate of two patterns, also to fit a flask on hand.

Overall Picture

In checking costs for the various equipment, the purchaser finds that the casting cost works out as follows:

Equipment No.	Cost.	Casting Cost.	Total Cost (Equipment + 200 Castings).
1	$25	$1.00	$225
2	35	0.92	219
3 (wood)	65	0.70	205
3 (metal)	165	0.60	285

Now, it will take no time to discard the quotations of shops No. 1 and No. 2. The only thing to decide is whether or not to spend $80 more on the first order to insure a low cost on all subsequent casting orders and have a permanent metal equipment, or take the lower first cost with a fair re-order casting cost. It is unnecessary to point out that shop No. 3, while quoting a higher pattern cost, got the job and made a good impression on the purchasing agent.

It will be found that in most cases a purchaser can and will extend the delivery date on patterns in order to gain a good unit cost. This is particularly true when multiple pattern equipment will enable the foundry to produce at a much faster rate

Customer Limitations

It would be the height of folly to design an equipment, for example, to be used with jolt squeeze machines and core blowers when the foundry is a hand shop; or to make an equipment which will produce 1,000 cores a day when the production will not be able to use 100 a day. In other words, not only production but also the mechanisation of the foundry using the pattern equipment must be considered.

It has been the Author's experience that cores are expensive and should not be used unless made necessary by the design. However, if a drawback can be eliminated or a parting made easier, there should be no hesitation in using a core. The pattern-maker should ask himself, "If I were the moulder, would I like to use this pattern?"

Moulders prefer a pattern with sufficient draft, no loose pieces, and if cores are used, prints having telltales so that cores cannot be misplaced. Also, clearance strips to prevent crushing should be provided.

The company with which the Author is associated has a planning procedure that works fairly well. When a request for a quotation is received, it is referred to a planning board consisting of the pattern and moulding superintendents who, after deciding which foundry department will make the job, call in the mould, core and cleaning foremen involved. This group then checks for present and future production and decides on the type of equipment. This information is then entered on an estimate sheet, going into detail as to just how equipment is to be made, giving flask size, number of core boxes, special arbours and core shells.

Each foreman then enters his respective cost. The pattern superintendent then reviews the equipment and enters time and material needed to produce the desired equipment, together with the cost. This card is then given to the cost department, which computes final casting cost and submits the quotation to the customer. If the order is obtained, the reverse side of the cost card becomes a job record card, so that both estimated and actual cost are on one card. This is desirable as it gives a ready check to the pattern foreman at all times.

The pattern-maker assigned to the job is encouraged to offer criticism and, if the foreman believes that a change is desirable, the planning group is called to the pattern shop and again goes over the job. Good ideas are often obtained in this way. In planning the job, rough shapes are sometimes cut out to better show partings, etc.

High production patterns are mostly of the smaller types, that is, flask work, so in this discussion pit work can be passed over with only a word of caution.

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* Abstract of a Paper presented at a pattern-making session of the 50th annual meeting, American Foundrymen's Association.

Patterns for a Production Foundry

The pattern must be removed from the sand, and the pattern-maker should provide a means of doing this without distorting either the pattern or the mould.

Cores

Medium size work—say 40 to 200 lb.—is a casting field requiring considerable mechanisation. The type and number of castings wanted largely dictate whether the pattern will be made for a stripping, a pin lift, or a rollover machine. A prime point to keep in mind is that cores cost real money and can develop into a bottleneck, but if the part can be moulded faster, then cores should be added (ram-up cores if possible, since a properly made ram-up core blends with the contour of the casting and shows hardly a joint, not to mention that they are easy to locate and hold in correct position). Then too, by adding a loose piece which can be removed when the mould is nearly rammed, and placing a core before completing the ramming, it often is possible to change a difficult three-part flask job into an easily moulded cope and drag, with a good saving in equipment and in cost of casting.

When planning for a set core, it should be considered that the moulder must set the core properly, without a lot of filing and fitting. It is false economy to skimp on print material. A core must have its proper foundation, the same as a building. Also, the prints should have proper tell-tales. If two tell-tales can be used without extra core-making cost, the pattern-maker should not hesitate to use them. Also, the core-print cannot centre a large core. If necessary, use a ram-up core ring in the green sand cope in which to enter the set core. Coreprints in the drag should have beads on the edges to receive any shaved sand. In this way the core setting is speeded up.

When designing the pattern, a few extra shillings should be spent to provide fillets even if a few loose pieces are added to pattern and core box. It should be remembered that the moulder's time is all production and that cutting fillets takes time.

When making a pattern for a production job using cores, it is well to remember that cores do not always run true to size, due to core box wear and sand and oil conditions. To overcome this, the pattern-maker should provide metal core rubbing frames so that all cores must be fitted. This sounds costly, but on a production job the moulding machine sets the pace, and no time can be spent by the core setters to rub, fit, and try outsize cores.

Another practice some pattern-makers follow is that of placing a loose piece on a pattern with one or two dowel pins—an inexpensive operation in the pattern shop, but one that should not be tolerated by the foundry unless the pattern is for emergency use for a limited run.

Loose pieces should be firmly secured to a backing piece, that is, dovetailed into the pattern. If six loose pieces of different sizes are used, then six quite different sizes or shapes of backing pieces should also be used, in this way insuring proper location of parts. However, if the six loose pieces are duplicates, then the backing pieces should all be identical so as to save the moulder's time in finding proper location.

In jolting the mould and in straight ramming, loose pieces will sometimes lift unless a pin is added to hold them down. When the pattern is large enough to allow it, mechanical means should be provided.

BOOK REVIEW

Statistics of the Iron and Steel Industry of the United Kingdom for the Year 1945. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1. Price 5s. net.

For those, who like the reviewer, sought for so many years to discover just what was the extent of the British ferrous foundry industry, this book and the earlier publications which it summarises, gives much satisfaction. Yet the more one studies the figures, the greater is the appetite for still more details. One is inclined to forget the work it has given to over-worked executives through the filling in of innumerable forms. Yet their work has been worth while, and all foundries should acquire this 60-page pamphlet, for it is reasonably sure that they will then see that their efforts have been worth while. Amongst the many interesting factors disclosed is the increase in the number of electric furnaces in this country. When the war broke out in 1914, there were but a handful in this country—at any rate only 22,000 tons of steel were made in 1915—representing the output of eight to 10 furnaces. A fivefold increase was registered during the first world war. To-day it appears that there are 221 electric furnaces, which produced in 1943 close on a million tons of steel, or nearly 8 per cent. of the total output of the country. At the moment there are listed, but only by asterisk, eight rotary furnaces for steel making. Will these pursue the course indicated by the electric furnace? For their progress only future statistical reviews will reveal, and herein lies but just one advantage in their collection. Naturally enough, real knowledge is needed for the proper interpretation of the 50 tables contained in the book. For instance, in iron foundry production, the output of the heavy cast-iron pipe and segment sections can materially modify the annual tonnage, without correspondingly influencing the labour force employed. When a Government spokesman said recently that the ironfoundry industry required to make another million tons of castings a year to catch up with pre-war demand, a reference to the two sections indicated would have brought the vista into better perspective.

V. C. F.

CONTROL TESTS FOR GREY CAST IRON

Discussion on the Report of Sub-committee T.S.6, and the A.F.A exchange Paper to the I.B.F.

The joint discussion of "Control Tests for Grey Cast Iron," by Sub-committee T.S.6 of the technical council of the Institute of British Foundrymen, and "Fluidity Testing of Foundry Alloys," by K. L. Clark (the exchange Paper of the American Foundrymen's Association to the I.B.F.), is given below. "Control Tests for Grey Cast Iron" was published in our issues of July 18, 25, and August 1. "Fluidity Testing of Foundry Alloys" appeared in our issues of August 29 and September 5.

DISCUSSION

THE CHAIRMAN (Mr. R. B. Templeton, vice-President) said the report on control tests for grey cast iron gave a very good survey of rapid tests for the evaluation of cast iron and the sphere of each type of test. Perhaps the type of test having the widest application was the visual, considered in Section 1; first, because it was the only type of test which could be carried out between tapping and pouring in normal cupola practice, and secondly, because no expensive apparatus was required.

The wedge, wafer, ring and fluidity tests all had specific applications, and whatever the product, one or other of those tests could be applied with advantage; in fact, the consistent production of a high-duty iron was impossible without such a guide. He stressed that some of the data given in that Section—for example, Table II and Fig. 12—were related to a particular practice and were not necessarily of general application. All those tests required careful correlation with production results before reliance was placed on them for control purposes.

In Section 2 of the report, dealing with analytical methods, the spectrographic and Spekker methods of analysis were only economic for the larger foundries, but where the amount of work justified it they had undoubted advantages over normal chemical analysis. Every laboratory should, however, consider the speeding up by crushing instead of drilling the samples.

Section 3, on mechanical tests, indicated that little could be done to speed up the mechanical testing of iron, beyond careful organisation of the methods.

Continuous Chart of Tapping Temperatures

Appendix A reviewed the latest developments in pyrometry as well as the more established methods. It was interesting to note that a continuous chart of tapping temperatures was within the bounds of possibility in the near future; such a record should go far to explain many variations in properties now uncertain, and would possibly give the first indications of erratic melting conditions.

The temperature correction chart (Fig. 34) would be of added value if average values for emissivity under different conditions could have been given. The word "emissivity" was a new one to him; but, taking black body conditions as 100 per cent., one obtained the other conditions such as E = 0.8, E = 0.6, and so on. He asked what would be the emissivity, for instance, of the metal surface of a ladle of iron; how would that compare with the black body 100 per cent. line? If the values were averages, one could arrive at a better interpretation of the chart. What did E = 0.3, and so on, mean in terms of actual conditions in the foundry, *i.e.*, the metal in the ladle or the metal coming out of the spout?

The American exchange Paper, by Mr. Clark, surveyed all the published literature—British and American—on the subject of fluidity testing, and reviewed the various methods proposed from the point of view of sensitivity and reproducibility of results. On the basis of those considerations it put forward a number of recommendations for a standard test which should cover all requirements.

The approach was from a practical angle, but the Author had not considered the underlying fundamentals, which would have increased the value of the Paper. In applying to practical problems the information gained from such a test it was necessary to keep in mind the factors having the greatest influence on fluidity. The vital points among those were the temperature margin, *i.e.*, the difference between the actual temperature and the freezing point, and the temperature loss per second, which was a function of the mould surface area in contact with the unit volume of metal. A study of the surface area of 1 cub. in. of metal in the form of plates of varying thickness was most enlightening and would help in considering mis-runs.

MR. BLAKISTON, commenting on the chairman's emphasis of the importance of the visual tests, said that Mr. Hobson had brought to the conference a very wide variety of examples of those tests, which were open to inspection after the discussion; he would describe every test in detail to anybody who wished that to be done.

Emissivity Clarified

MR. C. A. PAYNE, replying to the chairman's reference to the emissivity tests, said that the word "emissivity" was recognised and orthodox; it described the total amount of heat or light radiated from a hot body. Unfortunately, however, any body having a bright surface would not radiate the maximum possible amount of heat; and the ratio of the amount of heat radiated by a bright body to the amount of heat radiated by a black body was called the emissivity. It was employed in a rather complex formula for the calculation of the true temperature from the measure of the light emitted.

The matter, as illustrated in the diagram in Fig. 34,

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might be rather confusing. There were four straight lines, one of which was labelled E = 1.0, representing the emissivity for a black body. The other three full straight lines represented the decreasing emissivities. There was also a dotted line, representing the emissivity of iron oxide, as measured by Griffiths, of the National Physical Laboratory, and it approached very closely to the 100 per cent. It meant, in effect, that, if there were a layer of oxide on the metal, the readings would be closer to the true temperature than if there were a bright metallic surface. Then between the lines labelled E = 0.8 and E = 0.5 there was a line having a short curve in it; that line represented the change in emissivity with decreasing temperature. In the same iron the only factor which had changed was the temperature, and, as the temperature was reduced, so the emissivity changed, which meant again that the hotter the iron the greater was the correction that should be made to arrive at the true temperature. Just above the long line marked E = 0.5 there was a short curve or line, which related to another type of iron at the same temperature as that represented by the long line. The difference in composition was rather slight, but the iron with the lowest emissivity had the highest carbon and silicon contents.

Summarising, he said the emissivity would depend on temperature, and it would also depend on the composition of the iron. At the bottom of the diagram the apparent temperatures were shown; those were the temperatures as read by means of an optical pyrometer. On the vertical axis the figures represented the true temperature; by simply running the lines for emissivity from the apparent temperature line, one obtained the correction to be applied to the apparent temperature. That would depend on the metal, the temperature and the lighting conditions. In illustration of that, Mr. Payne said that, under three separate sets of conditions, using the same iron from the same furnace, there were corrections of from 70 to 150 deg. C. to make to the observed temperature.

THE CHAIRMAN said that, on the basis of the diagram in Fig. 34, supposing the measured temperature were 1,200 deg. C., under emissivity conditions of 0.3, if one carried a vertical line upwards it would show an actual temperature of 1,330 deg. C.

MR. PAYNE agreed that the actual temperature would be between 1,330 and 1,350 deg. C.

MR. TUCKER recalled that a year or two previously he had shown to certain branches of the Institute a curve of corrections of two different cast irons, one soft and one hard, showing that between 1,300 and 1,320 deg. true temperature the correction was very small indeed, and that below that temperature the correction was in the opposite direction; in other words, at temperatures above that it was necessary to take something off, and at temperatures below it it was necessary to add something. The metal was in a two-handed shank under foundry conditions, *i.e.*, not particularly well skimmed, and under ordinary foundry lighting.

The iron, the way in which it was skimmed, the cleanliness of the ladles, and the conditions in the foundry, all affected the results obtained with an optical pyrometer.

With regard to the American Paper, the temperature margin from the casting temperature to the freezing point (in other words, the superheat of the metal) and the rate of cooling at the various stages were very important. When he was with Newton Chambers & Company, Limited, he had been concerned with the production of certain air heater castings which needed careful running. In ordinary grey cast iron containing fairly high silicon, to balance 1 per cent. of chromium they had used 140 deg. superheat above the liquidus temperature as determined by the immersion pyrometer; cooling curves were produced, as referred to in one of the later sections of the T.S.6 report. An entirely different foundry metal—a 30 to 35 per cent. chromium cast iron—had also required 140 deg. superheat above the liquidus temperature for running the same casting. Thus, the point raised by the chairman was of very great importance. The results of spiral fluidity tests on both those metals at those temperatures were very similar; they were 22 in.

Keep's Test

MR. BEN HIRD asked for the opinion of Sub-committee T.S.6 with regard to the value of the Keep's test as a standard test in a small foundry. There was only a very brief description of it in the Report.

MR. BLAKISTON replied that when the Report was first drafted it was many times thicker than it was when published, and the Sub-committee had devoted much space to various contraction tests. After a long discussion they had concluded that, compared with the wedge tests and other tests available, the value of the Keep's test to-day was not such as it was previously. In fact, the information it gave was rather limited, particularly with regard to high-duty irons; probably the Keep's test would have been of more value when using phosphoric iron, which was common in the old days, but to-day the bulk of foundries were developing along the lines of high-duty or controlled irons, and thus the value of the Keep's test was lessened somewhat. He believed that was the general conclusion of the Sub-committee.

MR. HIRD asked if it were the Sub-committee's opinion that the Keep's test was still a fairly valuable test for soft ordinary grey irons of high phosphoric content.

MR. BLAKISTON replied that the Sub-committee did not condemn it outright, because many foundries still depended on it, but to a foundry which was starting afresh they would suggest concentrating on some of the other tests.

MR. F. J. COOK (past-President), who had used the Keep's test for many years, said he had found it to be very reliable, particularly with phosphoric irons.

MR. TUCKER suggested that much depended on the type of casting produced. If one had a casting with flanges at each end, such as air heater elements, one could use a 30 per cent. chromium cast iron having twice the Keep contraction of an ordinary grey cast iron; but one could make the castings from those two irons from the same pattern, and the castings would

be the same, simply because the castings were held by the flanges, which prevented the normal contraction. The Keep test did not show how much the casting would contract on pattern allowance.

MR. HIRD pointed out that one wanted to know that, because if the metal were held so that it could not move, then the greater the liability to contraction, the greater would be the internal strain. Therefore, it was better to use a test which would show the lowest degree of contraction to take out the strain.

MR. TUCKER commented that founders were held by specifications; they had, therefore, to adopt moulding methods which would effect the quickest release, and must also use the alloy which would give those properties.

Spiral Test

MR. H. J. YOUNG said he first heard the spiral claimed as a test for fluidity in Germany about 1922, and he brought home a blue print of the method of moulding, gating and running the spiral. He would have written a Paper on it but for one thing, namely, that he found it to be a test for other and unknown things as well as, and at the same time as, for fluidity.

In his view no test should be called a "control" until it had served an apprenticeship in daily practice and proved itself, without outside aid, in the foundry concerned. For the benefit of students it would not be waste of time to present three examples of this as follows: (*a*) The spiral was *put into production* together with ordinary castings, and at the end of each week the number of defectively-run spirals was counted against that of defectively-run castings; after three months no relation was traceable between the two sets of figures; (*b*) in the case of individually-cast rings (shown in Fig. 21) it was possible sometimes to find several rings, similar to those illustrated, in one stack of moulds, but not so many or none at all in the next stack cast from the same ladle; (*c*) when a consultant, Mr. Young sometimes found chemists patiently performing tests and recording results such as one might collect useless objects like seashells. In one foundry the results of a certain hourly test were plotted on squared paper hung on the laboratory wall and one day the results had been so abnormal that the curve had climbed a foot or more up the wall itself; asked what had happened to the output on that day nobody in the laboratory knew, all that the foreman could remember was that "things were no worse." It was thus with many tests. For example, take the fluidity test or the pyrometer temperature test. If, on performing a test and the result was found to be "low," the iron in the ladle was poured on the floor, then the test was truly a "control"; if, instead, the iron was used as usual and the test results recorded in a book day in and day out, then the test was futile. Another instance occurred in a foundry requiring to make certain large castings having a pre-determined depth of chill. They devised chill tests and prepared to sit back and worry no further. The end of the matter some weeks later was that only by making and breaking actual castings could progress be made, as the so-called chill test did what it liked and the castings likewise, but never did they synchronise—possibly because of mass action. The speaker at one time started up and ran for many years a laboratory and research department employing some 16 assistants; he was, therefore, not at all ignorant of the enormous value of applied science, namely, science which is applied. The young chemist would find little difficulty in doing vast numbers of tests, but it might take years of experience before he could usefully apply even a few.

MR. BLAKISTON remarked that much depended on what one meant by "high-duty" iron; the Sub-committee, in their Report, covered both high-strength and low-strength irons, all of which had to be controlled. Cylinder blocks, piston rings or any other articles which were produced in a repetition manner had to be controlled in order to ensure consistent products. The aim was consistency throughout, and the purpose of the control tests was to enable consistency to be achieved easily.

Low Fluidity Test Result

MR. W. JONES, who was also invited to reply to Mr. Young, said he was not a metallurgist, but a practical foundryman. With reference to the piston rings shown in Fig. 21, these defects were definitely due to the poor fluidity. This statement was backed by many tests and experiments, and, in general, it was found that when there was a low fluidity test result there was an increase in button risers. Further, if the fluidity test-piece did not run to the limit that was set, casting was not proceeded with, because a high proportion of scrap could be expected. Temperature entered into it up to a point, but it was not so important as the fluidity of the metal.

How to Increase Fluidity

MR. J. G. PEARCE (Director, British Cast Iron Research Association) commented that the Paper by Mr. Clark did not extend to the question of making the metal fluid when the test-pieces pronounced it not to be fluid. He had gathered from Mr. Tucker that, whatever the carbon or the phosphorus content, if the temperature were sufficiently high the casting would run. He wondered if that were true, and whether it was the experience of other members at the conference.

Temperature a Guide to Fluidity

MR. TUCKER replied that almost all the remarks he had made in presenting the Paper were extracted from the Paper and did not necessarily represent British opinion on the subject. He pointed out, however, that, in general, temperature was more important a guide to fluidity than fluidity was a guide to temperature. There were factors, however, such as bad furnace practice, excessive sulphur and others, which modified the fluidity of the metal for certain classes of work. That applied particularly to non-ferrous work. The state of deoxidation was far more important than actual temperature; therefore, both tests must be regarded as an assessment of the quality of the metal in the ladle. A metal to a certain specification should have a certain fluidity at a given temperature, and if it had not that fluidity there was

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something wrong with the metal; it might need deoxidation or some other treatment.

But that was not the opinion expressed by Mr. Clark in his introduction. Mr. Clark had stated that, in shops where metal was used at temperatures above 1,200 deg. C. for the pouring of castings which were susceptible to misruns, it was believed that routine fluidity testing could be employed with profit; and he had quoted the introduction of the spiral fluidity test, with no obvious temperature control, for intricate castings in the U.S. Naval Research Laboratory.

Mr. Tucker's personal opinion was that, in order to obtain consistent results, one should always measure the casting temperature of the fluidity test-piece in the shop. The records were there, and one would know whether the metal was deoxidised, and so on. If one were casting 20 boxes out of a ladle there might be sufficient fluidity to run the test-piece, and the fluidity might tail off more quickly in some states of deoxidation than in others. It was important to have that information, so that one could take remedial action later on and build up experience.

Now that we had a tool for measuring the temperature of cast iron accurately, he concluded, why not use it?

MR. PEARCE said he had gathered from Mr. Tucker that he had poured a normal cast iron at 140 deg. C. above the liquidus and the spiral test-pieces ran a certain distance, and that a 30 to 35 per cent. chromium cast iron (which would probably have low phosphorus and carbon contents), also poured at 140 deg. C. above the liquidus, had run for the same distance in the spiral test-pieces. That seemed to prove that one could pour any metal, provided the temperature were sufficient, and that it did not matter about carbon and phosphorus.

MR. TUCKER replied that that was so, in so far as carbon and phosphorus affected the liquidus temperature. The two metals he had mentioned were about the two most diverse in which he had made such measurements. It must not be assumed, however, that one could produce any casting successfully with any alloy at 140 deg. C. above the liquidus, because there were other considerations, such as internal shrinkage, cutting in of the sand, burning on of the sand, and so on, which must be taken into account. With certain alloys it might be necessary to use different gating and risering in order to produce equivalent castings in the sound condition.

Fluidity of Eutectics

DR. E. M. H. LIPS (Holland) asked what was the reason why, for instance, a eutectic alloy had a far better fluidity than a non-eutectic alloy. He mentioned some investigations made some years ago, which had included casting in a spiral of glass and studying crystal formation during cooling, and other matters such as surface tension, etc.

MR. TUCKER replied that there were two reasons. One was that the primary crystals commenced to solidify at a higher temperature than the surrounding alloy and, therefore, at a given temperature of casting, there was a bigger range between the casting temperature and the liquidus. The secondary consideration was the form taken by the primary crystals in an eutectic alloy.

Recalling that the FOUNDRY TRADE JOURNAL had published recently a Paper by him on sources of hydrogen in cast iron, he said that in the course of his work he had found that a theory could be evolved to explain certain obscure effects which depended on the fact that an eutectic alloy, in centrifugal casting at any rate, had practically a solid advancing wall of material, and in front of that wall there was liquid cast iron, whereas away from the eutectic there were the primary crystals solidifying at a higher temperature and then a mesh of crystals followed by the eutectic wall, blanketed by the "barbed wire entanglement." That explained the ease of liberation of gas in the extremely rapid solidification in centrifugal casting.

The eutectic alloy did not pass though the pasty stage which applied to the non-eutectic alloys. Particularly in the case of the piston rings mentioned in the Report it was found that a very slight increase of carbon—in other words, primary graphite—thrown out in the molten material reduced fluidity enormously in the spiral test-piece; so that carbon control had to be extraordinarily close. That was a reason for introducing the spiral test. Not only was it essential to have the wedge and taper chills exactly correct, but the fluidity had to be above a certain minimum.

Immersion Thermo-couple for Cast Iron

MR. C. A. PAYNE, referring to the immersion thermo-couple for steel, as distinct from cast iron, said there was still the problem of developing a refractory sheath, which must fulfil three conditions, *i.e.*, it must be capable of being made thin, it must withstand the action of temperatures up to and above 1,600 deg. C., and it must withstand thermal shock. Up to the moment it did not seem to be developing along those lines. What had to be done, however, was to replace the refractory sheath with an open-ended steel tube; that was immersed in the bath, and it was prevented from melting by a stream of inert gas which formed a hollow surface in the metal, and one actually read from that hollow surface in the metal.

Relative Merits of Wedge and Chill Test-pieces

MR. P. A. RUSSELL deplored any suggestion that the Report on control tests for grey cast iron was concerned only with high-duty cast iron. It was for the use of all interested in the making of good products.

Expressing his vital interest in the Report on control tests, and particularly that part which dealt with the wedge test, Mr. Russell gave his own experience with regard to control tests of that nature. He had tried to introduce a similar system and had started with the wedge test; but he had found that the wedge test was very much more susceptible to casting temperature than was the forced chill test-piece of the wafer type. For that reason, for his particular class of work he had decided to use the forced chill test instead of the wedge

test. He asked for opinions as to whether the susceptibility to casting temperature of the wedge test was any greater than that of other chill tests.

MR. J. H. D. HOBSON said this point was brought out during the Committee's activities, and generally they had not found any great differences in wedge results. They had taken out wafer tests and B.C.I.R.A. chill ests, and the differences experienced were due rather to variations in melting than to the particular tests.

Endorsing the view that the wedges could be applied to any iron, he said the graph in Fig. 12 covered probably 90 per cent. of the grey-iron castings which were manufactured. For instance, taking the line for total carbon, starting on the left at 3.8 (a very soft iron), it extended to the right, down to 2.8 total carbon. That covered a wide range of castings, from common grey-iron castings up to those which would pull at 28 to 30 tons per sq. in. The wedge dimensions and test times listed in Table I gave a range of sizes which were stepped up to cover that range of irons. So that for a very soft iron of 3.8 per cent. total carbon, such as very soft hematite iron, a very small wedge was sufficient for the purpose of the test. The wedge size was not determined by the thickness of the casting, but by the composition of the iron [in that connection he exhibited a ½-in. wedge "type B" which was used on soft iron castings of from 3½ to 8 or 10 in. thick, and from, say 2 to 3 tons up to 8 or 9 tons weight]. For the harder irons one needed a thicker wedge. Over the day's run, tapping every 8 or 10 mins., there was very little variation in the wedges or chills, unless there were fluctuations in metal charging, coke charging, blast, general conditions of operation and pouring temperatures. So that he had not come up against the trouble mentioned by Mr. Russell, although he had checked it up since it was mentioned to the Sub-committee.

Reduced Demand for Mechanical Tests

The wedge test could be efficiently applied in a one-man business, or in a large manufacturing concern; it gave a very quick and accurate guide to the characteristics of the iron, in most cases before the castings were poured, and at a very low capital expenditure.

During the war, he was concerned with producing castings to B.S. Specification 786, grades 2 and 3, when the inspector in charge called for a test-bar from every ladle. Tapping took place every 10 to 15 mins. throughout the day. That inspector had been thoroughly satisfied to have the opportunity to check wedge tests, and had thereby gained such confidence that ultimately only two tensile and two or three transverse tests were required at intervals during each week.

Referring to Table III of the Report, in which were given the ratios of "composition" or "cupola spout wedges" to "ladle wedges" for inoculated irons; Mr. Hobson said that for a low-strength iron the ratio was close, but as the strength of the iron was increased the total carbon content was usually lowered, then the ratio of "composition wedge" to "ladle wedge" increased. Wedges were exhibited to illustrate this important point.

Regarding machineability, under usual commercial conditions, there exists a ratio of 3 or 4 to 1 between the thicknesses of the casings and the respective "ladle wedge" readings. Wedges and test-bars were exhibited to illustrate the effect of reduced wedge readings upon machineability.

MR. J. L. FRANCIS was glad to note, from the remarks of Mr. Jones and others, that there were other factors in addition to temperature which affected fluidity; undoubtedly there was a combination of influences. He expressed thanks to the members of Sub-committee T.S.6 and to Mr. Clark for having prepared the Report and the Paper; a bibliography at the end of a Paper was always of value, but that provided by Mr. Clark was of particular value, for it must cover the whole of the work in most of the countries where such work had been done.

Commenting first on Mr. Clark's Paper, he said it would be of great advantage if a standard fluidity test based on the Author's recommendations could be adopted. Apart from indicating the suitability of molten alloys with respect to their running power, it would provide a means of measuring the effect on that property of modification to the charges and furnace working. It would also provide a means whereby the effects of ladle additions on flowability could be assessed.

Aggregate of Influences Revealed

High-duty irons were frequently treated with inoculants, deoxidisers, degassers and similar agents. A standard fluidity test would speedily show the net result of those on the running power. Similarly with respect to ferro-alloy additions it would afford a means of judging whether the chilling effect of cold additions was serious, or whether it was counteracted by any increase of fluidity. In the case of exothermic alloy additions it would provide a means whereby their benefit could be estimated.

Coming back to the Report on control tests, he said that such tests represented an important adjunct to metal melting and casting practice. There were so many variables operating in founding, and at one time control over most of them was negligible; then successful casting production was more a matter of chance.

Every time a variable was rendered subject to control at will, and its influence was thoroughly understood, we were a step nearer being able to produce castings with guaranteed properties and free from any kind of defect.

Simple, rapid and inexpensive control tests, particularly of the kind which could be made in the foundry during the course of production, were of very great importance and value. At the same time, as was stressed in the Report, it was essential that the tests themselves should be standardised in all details; otherwise their indications might be misleading and merely serve to introduce even more uncontrolled variables, in which case confusion would be worse confounded.

MR. TUCKER asked the Sub-committee if they had standardised the sharpness of the point in the wedge test, for he had found, when using wedges, particularly the small ones, that the sharpness of the pattern had an effect on the readings. He felt it was necessary to specify a sharp point or a specific roundness for the pattern-maker to achieve, in order to ensure that all users of the wedge test would be speaking the same .

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language; that would take us one stage nearer to a universal standardised test-piece.

He asked that speakers should indicate their preferences as between the down gate or the straight down sprue and overflow in the spiral test-piece, for the Report and the Paper recommended diammetrically opposite procedures.

MR. G. B. TAYLOR, referring to the thin edge of the wedge test-piece, said that that would be readily measurable if they had the lines to conform to the size of the wedge piece, and then a little circle, with a datum line at the centre of the circle.

MR. TUCKER suggested that it was up to the committee to specify that.

MR. BLAKISTON said that the wedge measuring gauge illustrated in the Report (Fig. 11) gave readings direct. The Sub-committee recommended a measuring device of a simple nature as illustrated in the Report. This would overcome the difficulty mentioned by one of the speakers as to the measuring point for the depth of chill if the point was rounded through either a sample mould defect or dull metal. Should this measuring device not be available, the usual practice was to measure to the chill from the wide portion of the wedge and not from the point. This again demanded an accurate sample mould.

MR. TUCKER said the point was that one either filled the mould or did not.

Number of Wedge Tests

DR. A. B. EVEREST said that when the work of T.S.6 was started the technical council had visualised the possibility of standardising on a small number of wedge tests, rather on the lines followed by the Americans. Some people were a little disappointed that it was found necessary to produce eight sizes of wedge, and he asked whether there was any possibility of reducing that number so that the test could be made more standard, and more generally acceptable.

Expressing particular interest in the section of the report dealing with porosity tests, Dr. Everest said that in connection with fundamental work which he had done it had been necessary to assess the effect of composition on porosity. He felt that that aspect of the subject was still very unsatisfactory, in that there was not a satisfactory test available to distinguish between irons with regard to their tendency to produce porosity in castings. The B.C.I.R.A. had a dumb-bell type test-piece, but it had not received much publicity; possibly that was why it was not referred to in the Report. The dumb-bell seemed to give more definite results than the "K" bar.

Commenting on the discussion concerning optical *versus* immersion methods for measuring temperature, he recalled that Mr. Tucker was very much in favour of the immersion method, and said that surely another factor which would enter to an increasing extent into the matter was the influence of alloy oxide films. Mr. Tucker was very familiar with high chromium irons. Was it possible to measure the temperature of such irons by optical means, because one imagined that the chromium oxide film would completely spoil the readings and give correction factors of unknown quantity?

Immersion Pyrometer Preferred

MR. TUCKER replied that it was because of the difficulty of measuring the temperature of 30 per cent. chromium cast iron with an optical pyrometer that he had adopted the immersion pyrometer. The difficulty was not due to the normal oxide film; it was due to the gas from the casting pots—these pots were glazed on the outside—bubbling up through the metal and causing turbulence, which in turn rendered the readings valueless. When they were able to use casting ladles which did not cause the gas to bubble back through the metal, it was possible to exercise day-to-day control roughly with the optical pyrometer—and he stressed the word "roughly." But, having had to use the immersion pyrometer at one time, neither the foreman nor himself would hesitate to go ahead with the immersion type as against the optical type, because of the freedom from error and doubt which they had enjoyed. They had great confidence in it. With regard to the connections used, he said that normally they were somewhat similar to those for grey cast iron, *i.e.*, ranging from 70 to 150 deg. C.

Wide Range of Wedges Necessary

MR. BLAKISTON, commenting on the criticism of the number of wedge tests which the Sub-committee had recommended, said they had had to visualise covering the whole range of the foundry industry; but they had pruned the various recommendations and had eliminated a considerable number of sizes, deciding finally on eight. However, the Sub-committee were still open to effect further reduction, if possible. The governing consideration was that someone was bound to say that the range of sizes did not cover his particular products.

Temperature Variations

MR. TUCKER said that casting temperature did affect the wedge chill test in sensitive irons; when the metal was very cold the chill went up. In the normal casting range for medium and light castings, however, minor variations of temperature from hour to hour practically did not affect the test.

MR. P. A. RUSSELL confirmed that.

MR. E. H. BROWN, referring to the estimation of temperatures, recalled that some 20 or 30 years ago he had been very interested, with Mr. Young and others, in developing the standardisation of casting temperatures by means of optical pyrometers, and they had concluded that it was infinitely better to measure the temperature of the molten stream from the ladle or from the cupola, endeavouring in every case to get the angle of incidence of the rays at right angles to the running stream. He asked whether, in the investigations made by T.S.6, consideration had been given to the method in which the temperatures were taken.

Hints on Use of Optical Pyrometers

MR. PAYNE replied that usually, on a standing ladle of metal, there was a surface film which was continually moving, so that the surface was not constant. Therefore, to take a reading by an optical or a radiation pyrometer the best plan was to do so from a moving stream, and preferably one falling through the air.

The influence of the glare from the stream was to some extent tied up with the use of a red screen or in some cases a combination of red and green. One reduced the wavelength of the light that was being measured as much as possible, and that to some extent minimised the variation, yet it still had a slight influence, and if it were present on one occasion and not another it was bound to influence the readings.

In dealing with a stream of molten metal one could only obtain snap readings, and the whole question reduced itself to the experimental error in taking the readings from the moving surface and matching two colours. It was generally quicker and more accurate to use an immersion pyrometer.

Analytical Methods

MR. N. D. RIDSDALE, referring to the section of the Report dealing with analytical methods, said the use of the spectrograph required a much more skilled operator that the absorptiometric methods, which later could be applied by comparatively unskilled people.

With regard to the determination of silicon in cast iron by the absorptiometric method, he had been working on a method which was quite satisfactory for up to 3½ per cent. of silicon, which was the normal range: the Report mentioned a maximum of 2 per cent. He had also overcome the interference of phosphorus up to about 2 per cent.

As to the evaporation method for silicon, he said it was possible and practicable to evaporate to a certain point just short of fuming with a suitable nitro-sulphuric mixture, in which one could completely dehydrate the silica. That would speed up the process.

Coming to the determination of chromium, he said that no mention was made of the persulphate method; he knew from experience, however, that that method was thoroughly reliable and was quicker than the Vignal permanganate method.

For molybdenum, the method put forward involved the separation by butyl acetate. It was true that the direct method, in which the molybdenum thiocyanate was formed and not separated out, had given difficulties. But those difficulties had been investigated and overcome, and it was possibly much quicker to get the thiocyanate figure without any butyl acetate separation.

Presumably the reference to sulphur by the volumetric method, in the Report, meant the evolution method.

MR. K. H. WRIGHT replied that one could train a man or youth of normal intelligence to use spectrographic methods, and such a man need not be a chemist. On the other hand, the application of the absorptiometer method did require a chemist, conversant with chemical formulæ and procedures.

With regard to the determination of chromium, he pointed out that the persulphate method was mentioned under "Method I" in the sub-section of the Report headed "Chromium."

He agreed that for sulphur the volumetric method could with advantage have been referred to as the evolution method. However, it was mainly a question of nomenclature; some people preferred one term, and others preferred the other.

He looked forward to the publication of details of the method of determining molybdenum without previous separation with butyl acetate.

Moisture Control for Spiral Tests

MR. A. J. SHORE asked whether, in making a fluidity test-piece, one should at the same time take a moisture test.

MR. BLAKISTON replied that normally the Sub-committee recommended that all the methods applied must be consistent and all the conditions must be consistent during the tests. Some foundries had the sand controlled, and the moisture was more or less known beforehand. But if a spot fluidity test was being taken, then definitely the sand conditions should be tested at the same time.

MR. TUCKER said that the point was dealt with in Mr. Clark's Paper, where mention was made to the work of Greaves and others who had found that, with between 3 and 7 per cent. moisture in the same sand, very little if any difference was found in the spiral readings obtained. He was merely quoting that from the Paper; he personally did not believe it.

Wedge Tests

MR. G. L. HARBACH said that at his works they were in process of developing wedge tests but, at present, they were in the laboratory stage and, so far, it was difficult to decide what the different chill sizes meant.

In a recent review of 6 months' working, 700 results had been plotted to show variation in chill with different silicon and carbon contents, and the results had proved to be so scattered that he was doubtful whether the method could be passed on to the foundry with any certainty that the chill gave any clear indication of changes in composition.

The chill results had been grouped according to silicon and carbon contents, in steps of 0.1 per cent. Si and 0.03 per cent. C, and it was found that with varying silicon and constant carbon the average of each group fell on a curve but the individual results in each group varied widely—15 results from the same mixture in one group gave chills from nil to 7/64 in. (2¼ mm.). With silicon constant and varying carbon the results were again scattered and the group averages did *not* produce a curve. The conclusion was that the variation in chill between 15 samples from one composition from one mixture was quite as much as the variation between representative samples from two different mixtures and, if the wedge test was to be of real use to the foundry it should differentiate clearly between different mixtures; therefore he asked the Authors within what limits the wedge test would indicate differences in analysis.

Control Tests for Grey Cast Iron

A further difficulty was the sharpness of the edge of the wedge. They had at first experimented with four different sizes of wedge and the one with the sharpest point seemed to be satisfactory but, when it was taken from the experimental side and became mass-produced for daily tests, the sharp point was not always there; thus different chill depths could be obtained from the same wedge test-piece according to the width of the point in the region of the fracture. They had since adopted a 1/64-in. radius point, but unfortunately this showed no chill when the silicon exceeded 2 per cent. with 3.2 to 3.3 per cent. carbon. Mr. Blakiston had recommended that the point should be as fine as could be produced mechanically. Could the Authors give a definite radius that would be small enough to be critical and thick enough to be consistently mass-produced?

At the moment he felt that, under closely controlled conditions, the wedge test might be satisfactory but, could it be used safely in practice in the foundry?

Wedge Test Comparative

MR. HOBSON said that the eight sizes of wedges given in the Report were necessary to cover practically all general engineering castings.

The wedge test was not an analytical control, but a simple comparative test, an index of charged materials and melting conditions. Thousands of tons of grey-iron and high-strength iron castings had been made with the aid of the wedge and forced chill control tests, so that the Report could not be regarded as an untried experiment. The members of the Sub-committee had practised these methods in their works over a period of years, manufacturing very light to heavy engineering castings, and they had every confidence in recommending the Report as a first step to a standard form of foundry control test.

If a foundry was supposed to be producing a regular iron, and the wedge tests showed variations, then something in the operation was varying. Given uniform charging, melting and testing conditions, the wedge test would be uniform; if there were fluctuations during the melting programme, the wedge tests would indicate them. This feature was very useful when changes in the melting programme were arranged; for instance, at times he had cast five different irons, ranging from B.S.S.321 to B.S.S.786-4, during a morning run from 7.30 a.m. until mid-day. It was not necessary to employ a metallurgist for that purpose, as reasonably good control could be affected by the average cupola attendant, who by means of time clock and wedge control could tell when and how the tapped metal was changing.

DR. T. B. CROW wrote that the relation between superheat and result obtained in a spiral fluidity test might be clarified somewhat if it be borne in mind that the metal would travel a distance A to B in the spiral before solidification began, and then a distance B to C whilst it was in the liquidus-solidus state, C being the final point reached. If therefore, the point B could be determined, the ratio AB:BC could be ascertained and therefore the value of superheat in prolonging the fluidity. He realised that B would not be sharply defined, but wondered whether a careful macroscopic structure examination of the spiral might not reveal its approximate location. He did not know if any investigator had examined the macrostructure of spirals made under controlled conditions of superheat, but he suggested that this was a method which might give interesting data and hoped that someone with the necessary facilities might give it their consideration.

Vote of Thanks

DR. A. B. EVEREST, proposing a cordial vote of thanks to the members of T.S.6., to Mr. Clark for his Paper, and to Mr. Tucker for having presented it, recalled that some years ago, the earlier Cast Iron Sub-committee of the technical committee had had on its agenda the standardisation of wedge tests. The Report was the result of the work which had followed from that, and the Institute and the industry were greatly indebted to Mr. Blakiston and his colleagues for their efforts.

The Paper by Mr. Clark fitted in very well with the Sub-committee's report, and warm thanks were due to him and to the American Foundrymen's Association for having put forward the information it contained.

MR. A. J. SHORE, seconding, made the point that the cupola man was very interested in using the wedge test and similar tests, and thus he was brought more closely over to the scientific side; the charge hands and all the people in the foundry also became very interested, and the opportunity was afforded to put over some propaganda. (The vote of thanks was carried with acclamation.)

MR. RUSSELL wrote that he had hoped that the discussion on the T.S.6 Report would bring out certain aspects of the wedge test, but as it did not he would like to submit the following question to the Sub-committee.

The Report recommends a range of wedge sizes, and each size has a different angle for the point. Theoretically, it would seem that a constant angle would be better for giving results capable of being interpreted for each size of wedge. Can the Sub-committee state why it has been found necessary to vary the angle?

Sub-committee's Reply

MR. HOBSON, replying on behalf of the Sub-committee, wrote that it was necessary that some consideration must be given to the effect of "mass" or "thickness" of a wedge as in any other casting, upon its tendency to exhibit chill. This effect has been accounted for in the determination of the wedge dimensions given in the Report; whilst Fig. 2 was shown with the object of illustrating that as the wedge dimensions were increased the included angles of the chilled portions were decreased. The diminishing of these angles may be considered as a correcting factor for the effect of mass and produces identical wedge readings for the same iron when wedges of different dimensions are used.

SEE-SAW IN METAL PRICES

By "ONLOOKER"

In these days the lot of the consumer is certainly not a happy one, a recent illustration of this fact coming from the United States, where users found themselves in the unhappy position of being unable to buy all the zinc they wanted from the producers, while the Civilian Production Administration refused to sanction release of metal from the stockpile. Of course, the authorities had to give way eventually, but much uncertainty and delay was caused before the officials saw the red light, and it is not remarkable that consumers are looking forward to the day when free markets will again be restored. At the time of writing the new maximum price for zinc has not been announced, but it is likely to be quite a bit higher than the present one, and informed opinion suggests a level of 10½ cents per lb. In the meanwhile everybody is, of course, a bull of this metal, for it is pretty obvious that purchases made to-day will yield a useful profit in due course.

One of the sinister features of the present trend of prices, both here and in the United States, to-day, is the calm assumption that the profit and loss account can always be put right by passing all troubles on to the consumer, whether he is paying for goods or services. Halfway through this year the railways announced an increase in passenger and goods rates, and now it seems as if there is going to be another rise to enable the accounts to be balanced. In the same way the mining companies, whether their product be metal or mineral, just clap another few pounds or shillings per ton, as the case may be, on to their price to the consumer, and wait for the additional profits to roll in. So far since the end of the war this has worked, and the limit of endurance on the part of the users has not yet been reached, but the writing is on the wall, for there have already been indications on both sides of the Atlantic that a buyer's strike is not by any means an impossibility.

The Case of Copper and Lead

So far as the non-ferrous metals are concerned, there has been a spate of explanation about rising costs, and it is generally understood that even in those copper properties which before the war were regarded as low cost, there has been such a mounting wage bill, coupled with a vastly higher charge for necessary materials, that a quotation of around 16 cents is necessary if profits are to be earned. Prior to 1939, the Rhodesian and Chilean companies were credited with an ability to sell at 6 cents without being in the red, and there does not seem to be any reason to disbelieve this. At 16 cents, therefore, they should be doing fairly well, even allowing for the big increase in their output costs. It is, of course, common knowledge that many, perhaps most of the mines during the war, were obliged to scrap plans for orderly development in favour of an intense but somewhat haphazard production drive. They can hardly be blamed, therefore, for wanting to recover something by maintaining a selling limit a good deal in excess of what may be regarded as a bare minimum.

Nevertheless it is difficult to believe that the producers of non-ferrous metals will be ruined when a reaction sets in and prices drop well below their present inflated levels. Not many weeks ago it was reported that a lead property in Newfoundland, which had been closed for many years, was being re-opened, one can only presume because the price is so attractive. Lead, of course, stands at a higher level to-day than it did during the boom after the first world war, and demand is likely to tail off in due course due to the introduction of substitutes, unless there is a drastic downward revision in value. When producers have to bow to the inevitable, as they did in the early years of the last decade, it is surprising how costs are adjusted to meet the changed conditions. It is hardly likely that we shall see prices in the immediate or near future back to such slump levels, and it may even be doubted whether we can expect a return to the immediate pre-war quotations. For one thing, we must remember that the external value of the pound sterling has changed, and that affects internal prices in the U.K.

Those who believe in the need for a restoration of terminal markets will agree that what the present situation needs is the provision of an "umpire" in the guise of an independent price estimator. At present the producers call the tune and the consumers have to dance to it, and in altered circumstances, with metals in over supply, the rôles would be reversed. Such an arrangement can only lead to extremes in price, as each side in turn weighs down the scale in its own favour, and there is a marked tendency to hold on a particular course long after signs have been given that there are breakers ahead. The present situation in non-ferrous metals is an excellent example of this, and one can be pretty sure that before the producers eventually make up their minds that the background has changed from scarcity to something approaching glut, the position will have been seriously undermined and the stage set for a slump. The existence of a futures markets allows the laws of supply and demand full play and curbs the dictatorial powers assumed (however unwillingly) by the producers and consumers in turn under the present system. Whether the Government have made up their mind on the course to pursue is not known, but if the bulk purchasing endures much longer, until the point is reached when supply overtakes demand, there is a grave risk of chaotic price conditions developing.

A NEW CZECHOSLOVAKIAN FOUNDRY JOURNAL

The name of this new journal is Hutnické Listy. The editor is Prof. Písek, and it is published from 8, Mucednická; Brno-Zabovresky. It is the official organ of the Czechoslovakian Foundrymen's Association. A short review of each of the principal articles appears as a sort of appendix, and this is presented in Russian, English and French. It is to be issued monthly, and the yearly subscription is, we understand, 150 CS crowns.

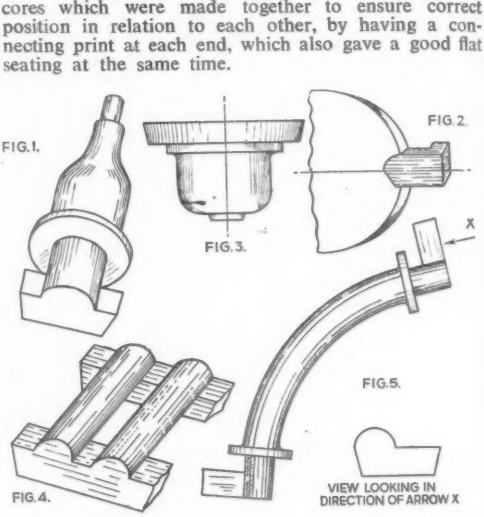
COREPRINTS

By "CHECKER"

The primary use of coreprints is for carrying and positioning cores, and their size and shape vary considerably according to the type of pattern for which they are required, and while the position of the straight core does not matter in its length, with the cores of varying shape it is important to get the position correct in every way, and also to have some means to guarantee that each core will correspond in every mould.

Fig. 1 shows a pattern with a print each end, and to ensure the correct setting of the core and also to give a good firm seating, an extension has been added from the pattern joint on the bottom half, giving a flat bottom for the core to rest on; this also supplies a shoulder each side of the diameter for the core to butt up to away from the end of the core. Generally speaking it is not advisable to rely on any core being set from the outside, owing to the habit of some moulders of filing the ends of cores, and while the pattern-maker may be allowed to make his core box with slight clearance at each end, any part which is to be used for setting the core must be dimensionally correct in both print and core box.

Fig. 2 shows a print to carry the core for a recess which had to be cast in a flange, it will be noted in this case that an extension had been added on the one side to act as a stop to prevent the core being positioned too far forward. A more simple type of coreprint is shown in Fig. 3, this is the overhanging type, the core resting on that part of the diameter protruding beyond the flange, should the inside of the casting have bosses, ribs, etc., which must be in a definite position with others on the outside, then a set must be placed on the print. Fig. 4 shows two barrel cores which were made together to ensure correct position in relation to each other, by having a connecting print at each end, which also gave a good flat seating at the same time.



The coreprints shown on the pipe in Fig. 5 have to act as balancing prints as well as for positioning the core, the tail extension on the prints cut out the need for excessively long round coreprints, by giving a seating much nearer the centre of the pipe, and therefore assuring good balance.

AMENITIES IN A SCOTTISH FOUNDRY

The formal opening of the new shower baths and changing rooms for workers at the Gowanbank Works of M. Cockburn & Company, Limited, took place on September 11. Mr. R. L. Hunter, director and general manager of the company, was in the chair, and the opening ceremony was performed by ex-Provost A. G. Logan, O.B.E., organiser of the Ironfounding Workers' Association Executive; he was accompanied by Mr. Scott, also of the Ironfounding Workers' Association Executive, and others.

In introducing ex-Provost Logan, Mr. Hunter said their guest had devoted a strenuous lifetime to improving the conditions of life in the foundry industry and as he was soon to retire to a well-earned rest, it was fitting that a small ceremony of this nature should be a token of the results of the work of all those who, like him, had striven to make foundries decent places to work in. Much had been written recently in the Press about shortage of baths for housing schemes. His firm was the second largest bath works in Britain, and to-day it was producing 15 per cent. *over* the output figures of 1938 or 1939. The entire production without exception was devoted to housing schemes or other schemes carrying Government first priority certificates. They were well ahead of the estimated programme, although of course there was an enormous amount of work still to be done.

After declaring open the new department, Provost Logan headed the party in an inspection of the changing rooms. These were fitted up with the most modern equipment for storing and drying clothes. In the morning when workers arrive they change into working clothes, leaving their ordinary clothes on special hangers in charge of the attendant. At the end of the day's work the moulder strips and has a shower, then puts on his ordinary clothes and leaves the works ready dressed for spending the evening in any way he chooses. His working clothes are made thoroughly dry and ready for him next morning. Arrangements have been made with a local laundry to collect garments for washing every week and return them the following week, thus taking much trouble and dirt out of the home. A boot-repairing shop is also being installed.

The shower rooms consist of a white tiled hall with eight hot and cold showers and 12 basins. No accessories seem to have been forgotten, showers, lavatory basins, soap-trays, etc., have all been made in the works.

COPPER IN CAST STEELS

Excellent casting characteristics and high physical properties, which can be developed in both light and heavy sections, should make copper alloy steels of interest for post-war castings, according to a report, PB-13,748, prepared by H. F. Taylor, H. F. Bishop, and R. C. Wayne, which deals with research on copper alloy steel castings at the U.S. Naval Research Laboratory.

Low alloy copper-bearing cast steels are said to be particularly useful for light-weight castings, since the addition of copper increases the ratio of yield strength to tensile strength without materially affecting ductility. If manganese and silicon are added in above normal amounts, even better properties are obtained.

Other advantages pointed out in the report include: (1) Alloy steels containing more than 0.6 per cent. Cu may be precipitation-hardened without liquid quenching to increase yield and tensile strength still further. These steels have low impact resistance, but good elongation and reduction of area. Sections as large as 8 in. can be hardened throughout by a precipitation strengthening draw after normalising. (2) Copper alloy cast steels containing not more than 0.20 per cent. C show good weldability. If they contain about 0.10 per cent. C and have a yield strength above 22 tons per sq. in., they are readily weldable without preheating or post-heating. (3) A combination of copper and 1 per cent. (or more) Si results in excellent fluidity and prevents the steel from becoming brittle at subzero temperatures. (4) Copper alloy steels are more resistant to scaling during heat-treatment than are plain carbon or molybdenum steels.

BRIGHTER LAMP-POSTS

Mr. Barnes, Minister of Transport, has been appealing for more artistic lamp-posts. The average urban lamp-post is hardly an *objet d'art*. It is utilitarian and conventional to a degree, and homely though its appearance is, it has little to offer the æsthete. Few visitors have left this island murmuring, "I think your lamp-posts are wonderful."

The only exception to the rule is the kind of lamp-post erected outside the home of a Provost. You can always tell where a Provost has lived by the ornamental lamp-post outside his gate. If you happen to be an absent-minded Provost this must prove very useful on dark nights.

It would be a good idea if respectable citizens were allowed to adopt lamp-posts, as it were. As a reward for diligent citizenship they could be allocated a lamp-post on which to lavish their care and affection. The lamp-post could express something of the personality of its guardian. How pleasant it would be if one were to recognise the home of a poet simply by the sight of a poetical lamp-post.

[A good idea but a little expensive, perhaps.—EDITOR.]

FRENCH FOUNDRYMEN'S ASSOCIATION

ANNUAL CONGRESS IN PARIS

The Association Technique de Fonderie is to hold its 20th annual congress at 66 rue Boissière, Paris, 16, on October 18 and 19. It is to be presided over by Dr. Paul Bastien, who at 9.30 on the Friday morning will deliver his inaugural address. The actual conference will be opened by Mr. P. Ricard, vice-president of the employers' federation. The following Papers will then be presented:—

"Foundry Defects," by Mr. F. Boussard (Belgian exchange Paper); "Present Position of the Centrifugal Casting Process," by Mr. J. Boucher, of Pont à Mousson, and "Some Practical Notes on Gas in Iron and Steel," by Mr. E. Eyt, of Commentry, Fourchambault and Decazeville.

I.B.F. Exchange Paper

In the afternoon at 2.30, Mr. F. Hudson's Paper on behalf of the Institute of British Foundrymen will be presented. This is "Standard Test-bars for Non-ferrous Castings."

Further Papers are:—"A Contribution to the Study of Special High Tensile Irons," by Mr. G. Delbart and Mr. Potaskin (Blast Furnace Research Association); "The Manufacture of Ingot Moulds," by Mr. Charmeau, of Schneider; "Aircraft Foundry Control," by Mr. R. Buquet (Aeronautical Technical Service Dept.), and "Electro-chemical Actions of the Etching Media Used for the Microscopical Investigation of Grey Cast Iron," by Prof. F. Girardet (Saint-Die).

At 9 a.m. on Saturday the following Papers are to be presented:—

"The Modernisation of Small and Medium Foundries to Achieve Increased Production," by Mr. C. W. Schwenn (American exchange Paper); "Polarographic Analysis in Foundry Laboratories," by Dr. L. Jenicek (Czechoslovakia); "Unknown Factors in the Selling Prices of Highly Developed Foundries," by Count de Fleury; "Accident Prevention and Safety Sense in Foundries," by Mr. R. Couppel du Lude (Safety First Association), and "The Possibilities of Fuel Economy in the Melting of Metals," by Mr. J. Bobst (Switzerland).

At 3 p.m. in Salle d'Iéna, 10 Avenue d'Iéna (16), there is to be a reception in honour of Mr. P. Chevenard, the immediate past-president. He is to be presented with a sword of honour in recognition of his election to the Academy.

A DEMONSTRATION OF an oxy-electric arc-welding and cutting apparatus was given at Alexandra Dock, Liverpool, last week, to representatives of Merseyside ship owners and shipbuilding and repair contractors. It is claimed that the new apparatus will weld and cut under water in half the time taken by oxy-hydrogen apparatus.

IMPORTS AND EXPORTS OF IRON AND STEEL

BOARD OF TRADE RETURNS FOR AUGUST

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in August and in the first eight months of 1946. Figures for two-thirds of 1938 are given for purposes of comparison.

Total Exports of Iron and Steel

Destination.	August, 1946.	Eight months ended August.	Two-thirds of 1938.
	Tons.	Tons.	Tons.
Eire	2,936	42,550	37,146
Channel Islands	396	3,681	4,944
Palestine	7,377	67,744	5,380
British West Africa	2,596	28,023	33,162
Union of South Africa	21,716	161,563	154,058
Northern Rhodesia	143	2,236	13,716
Southern Rhodesia	582	36,024	24,142
British East Africa	2,715	18,770	17,288
British India	6,257	52,942	105,784
Burma	1,977	10,598	12,342
British Malaya	4,243	24,408	44,390
Ceylon	1,987	9,609	17,354
Hong Kong	1,307	12,138	15,730
Australia	4,157	24,071	113,936
New Zealand	4,715	32,476	87,922
Canada	864	5,371	56,940
British West India Islands	2,136	16,778	29,500
Anglo-Egyptian Sudan	1,740	12,316	5,526
Other British Countries	3,836	20,563	14,610
Soviet Union	—	2	2,900
Finland	5,641	34,085	11,738
Norway	5,099	54,198	13,516
Iceland	1,242	8,963	438
Denmark	13,189	158,942	58,170
Poland	58	12,961	1,658
Netherlands	9,076	118,733	34,372
Dutch East Indies	1,369	6,721	18,204
Dutch West India Islands	465	7,078	1,642
Belgium	4,185	23,744	13,550
France	4,462	55,109	8,924
Portugal	4,094	35,740	5,142
Portuguese East Africa	280	3,087	9,480
Spain	535	7,404	5,176
Italy	1,135	4,684	3,426
Greece	2,961	10,077	1,168
Turkey	327	8,723	9,172
Egypt	3,837	70,499	22,940
Iraq	946	37,877	17,160
Iran	1,194	60,257	73,586
China	2,258	13,577	14,754
U.S.A.	98	626	1,458
Venezuela	1,876	22,543	3,116
Ecuador	769	2,766	1,062
Chile	632	4,013	4,196
Brazil	5,210	35,165	11,326
Uruguay	2,203	9,255	5,058
Argentine	8,951	61,647	52,904
Other Foreign Countries	26,610	178,563	77,142
Total	180,382	1,628,900	1,277,250

JOHNSON & PHILLIPS, LIMITED, manufacturing electrical engineers, etc., of Charlton, London, S.E.7, have now received Treasury consent for the issue of 200,000 ordinary shares of £1 each at 65s. per share. These are to be offered to present shareholders in the proportion of one new share for every four shares held. Permission was refused when application was made last December, the Capital Issues Committee withholding permission on the grounds of the "element of bonus" contained in the proposed price, which was then 60s.

Total Imports of Iron and Steel

From	August, 1946.	Eight months ended August.	Two-thirds of 1938.
	Tons.	Tons.	Tons.
British India	1,212	12,189	103,756
Australia	15,458	75,714	24
Canada	3,918	88,006	78,250
Other British Countries	359	612	3,732
Sweden	336	1,946	59,864
Norway	1,492	5,798	22,516
Belgium	1,451	3,624	182,454
Luxemburg	—	15	39,068
France	40	179	171,564
U.S.A.	24,686	120,286	133,794
Other Foreign Countries	2,433	2,987	101,160
Total	51,385	311,356	896,180
Iron ore and concentrates—			
Manganiferous	13,250	77,267	41,522
Other sorts	604,186	4,286,061	3,401,246
Iron and steel, scrap and waste, fit only for the recovery of metal	50,230	330,991	421,468

Exports of Iron and Steel By Products

Product.	August, 1946.	Eight months ended August.	Two-thirds of 1938.
	Tons.	Tons.	Tons.
Pig-iron	4,347	9,922	62,628
Ferro-alloys, etc.—			
Ferro-tungsten	7	213	344
Spiegeleisen and ferro-manganese	4,993	42,375	3,404
All other descriptions*	46	792	698
Ingots, blooms, billets and slabs	155	2,563	6,496
Iron bars and rods	726	7,937	2,132
Steel and tinplate bars	—	221	8,254
Wire rods and bright steel bars	6,831	41,167	6,512
Other steel bars and rods	17,005	181,327	68,000
Special steel	1,815	12,196	3,288
Angles, shapes and sections	8,993	102,132	44,936
Castings and forgings	196	1,987	1,078
Girders, beams, joists and pillars	3,365	49,651	22,314
Hoop and strip	6,523	56,188	24,918
Plates, ⅛ in. thick and over	21,924	225,776	87,306
Black plates	1,450	17,947	9,692
Black sheets	5,037	33,062	42,340
Galvanised sheets	5,162	24,016	97,956
Tinplates	13,348	76,512	212,872
Tinned sheets	116	1,612	940
Terneplates	176	653	2,884
Decorated tinplates	50	464	2,912
Cast-iron pipes, up to 6-in. dia.	3,732	29,087	32,618
Do., over 6-in. dia.	1,213	21,672	28,642
Wrought-iron tubes	20,039	180,399	146,648
Steel rails	11,462	129,839	70,666
Sleepers and fishplates	6,274	75,593	16,922
Other railway material	3,689	17,659	17,848
Wire	8,046	54,488	36,788
Wire manufactures	4,025	23,518	19,660
Nails, tacks, etc.	616	5,533	2,538
Rivets and washers	475	5,896	5,690
Wood screws	391	3,847	1,674
Bolts, nuts, and metal screws	2,073	16,038	11,716
Stoves, grates, etc.	441	3,820	6,100
Sanitary cisterns	99	727	1,874
Fencing material	149	2,387	3,420
Anchors, etc.	709	3,947	4,224
Chains	975	6,165	4,194
Springs	227	4,019	2,620
Hollow-ware	4,507	51,768	7,136
All other manufactures	8,975	103,758	144,303
Total	180,382	1,628,900	1,277,250

* The figures for 1946 are not completely comparable with those of earlier years.

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STEEL INDUSTRY AND PUBLIC OWNERSHIP

MR. MORRISON'S DECLARATION

Mr. Herbert Morrison, speaking in London recently, declared that there had lately been a tendency on the part of the interests scheduled for socialisation—whether in co-operation with the Conservative party organisation he did not know—to take action with a view to impeding the intentions of the Government and Parliament which the people had elected. Mr. Morrison said he wanted to make it clear that the Government would, subject to Parliamentary approval, go ahead with all the policies which it believed to be in the public interest, and that it would not be campaigned away from them.

The Minister of Supply had agreed that the new Iron and Steel Board need not be involved in the policy of socialisation, and the owners, on the other hand, had agreed to remove their embargo on any of their experts sitting on the board. "When," said Mr. Morrison, "Mr. Wilmot made his announcement about the setting up of the board, quite a number of newspapers rubbed their hands and said, or implied, that the Government had capitulated and intended to throw over its policy of public ownership. Well, it is not for me to discourage our opponents from cheering themselves up if they feel that way, but let me assure you that when the Government said that it was going to introduce, in due course, a scheme providing for the essential principles of public ownership and control over an appropriate area of the iron and steel industry, it meant what it said, it still means it, and the necessary measure of socialisation will be placed before the representatives of the people in Parliament in good time."

Steel Trade View

Lord Aberconway, chairman of the Sheepbridge Coal & Iron Company, Limited, in his speech at the annual meeting, held in Sheffield last week, said:

"To all those who have a knowledge of the iron and steel trade, it appears most strange that the Government should propose its nationalisation. Any present shortage of production is due to the fact that naturally, during the war, very little in the way of extensions could be done, and, even since the war, plans for increasing production have been greatly handicapped by delays and refusals on the part of the Government in the granting of licences to proceed with new capital outlay.

"Nationalisation of an industry can only be justified on three grounds; namely, that it is badly managed, that it is short of capital to carry out necessary improvements, or that Government management is, by its nature, bound to be superior to management by private enterprise.

"Now the iron and steel trade is one of the best managed trades in the country; it has ample funds

(*Continued at foot of next column.*)

A BLACK COUNTRY APPRENTICESHIP SCHEME

For the purposes of conducting an apprenticeship scheme, the two firms of John Harper & Company, Limited, and John Harper (Meehanite), Limited, of Willenhall, Staffs, operate as one concern. To emphasise modern amenities it is stressed that the moulding shops are properly ventilated; apprentices must use the washing facilities provided before leaving the works every night; there is an ambulance room under the charge of a trained nurse; a canteen in which hot meals are served; a well organised sports and social club, and a wide choice of trades to follow. The scheme is very elastic, and it is difficult for any concern to be very definite, as there is the incidence of military service to consider. This is ignored in the prospectus, which is well presented in a 24-page illustrated brochure. Cognisance, however, has been taken of the provisions for when the new education act comes into force. It is interesting to compare the terms of apprenticeship as set out with those of John Harper, Junior, which are reproduced at the end of the booklet. Young Harper was apparently only entitled to his keep, clothes and laundry, whilst the boy of to-day receives wages ranging from 22s. to 65s. during the same period.

GOVERNMENT'S STEEL POLICY

"Men and Metal," the journal of the Iron and Steel Trades Confederation, comments as follows in an article in the September issue headed "Steel Policy":—

"No reflection is cast on the Government by adopting a new approach to public ownership. Second thoughts are not to be deplored when the future of a basic industry is under consideration. What we have witnessed in the fresh approach is not something new and quite unprecedented; on the contrary, we have simply experienced another example of that realism and sturdy common sense which has characterised the entire Labour movement since its very beginning. The Government, by changing their approach, have cleared a path for a real advance. The rapid, planned development of the iron and steel industry is now possible, while at the same time the Government, without sacrificing the principle of nationalisation, have allowed themselves time really to think out their nationalisation ideas in relation to the complex problems presented by this industry. Thus, by changing their attitude, the Government have removed the risk which undoubtedly faced them of more haste less speed."

(*Continued from previous column.*)

to finance the very large extensions which it has planned; and, lastly, all our experience tends to show that Government management of industrial enterprises is singularly inefficient. It is profoundly to be hoped that when the Government go more closely into the details of their policy, even they may decide that there would be no advantage to be gained by pursuing it."

YOU CAN MAKE *BETTER USE* OF STEEL CASTINGS

For the improvement of the already high standards of British Steel Castings, a Technical Advisory Bureau has been created by the B.S.F.A., an organisation which represents the combined resources of Britain's Steel Founders. All using, or likely to use steel castings can call upon this Technical Bureau—its library, statistical, and research departments—to receive the latest data upon steel castings processes, and usage; to resolve difficulties of design or in any way to help secure the utmost accuracy, & highest quality of steel castings.

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STEEL CASTINGS

Longleys

NEWS IN BRIEF

THE CALEDON SHIPBUILDING & ENGINEERING COMPANY, LIMITED, Dundee, is celebrating its jubilee year.

WEDNESFIELD URBAN DISTRICT COUNCIL is seeking a compulsory purchase order respecting 118 acres of land at Neachells, in order to develop it as an industrial area.

THE INDUSTRIAL COURT has upheld a claim by men working in the spun plant section of Cochranes (Middlesbro') Foundry, Limited, for the foundry wages agreement of February 21 to be applied to them.

A TECHNICAL EXHIBITION is to be held at the Kelvin Hall, Glasgow, from November 15 to 27. From a preliminary list of exhibitors received, it appears that it will contain a fair percentage of exhibits of interest to foundrymen.

THE BUILDING OF standardised factories, ahead of allocation, were among big development plans for North-East England announced at Newcastle-upon-Tyne by Sir Philip Warter, Board of Trade adviser on trading estates.

SIR WILLIAM ARROL & COMPANY, LIMITED, Glasgow, have received a contract from the Dublin Port and Docks Board, for 26 electric cranes. Erection of the cranes will be completed by 1950. The contract is stated to be worth more than £230,000.

GRAY & COMPANY (BRASSFOUNDERS), LIMITED, Glasgow, are to supply gunmetal castings for the Glasgow Corporation Gas Department. Henry Balfour & Company, Limited, Levan, are to supply cast-iron hydraulic clinders for Dalmarnock Gasworks, Glasgow.

THE U.S. MILITARY GOVERNMENT HEADQUARTERS has announced that 80 tons of machinery and machine parts from the Württemberg machine factory of Fritz Müller at Oberesslingen have been allocated to Great Britain, the consignment, which is the first to be sent to a Western Power, being based on the allocations agreed upon by the Inter-Allied Reparations Commission.

THE BOARD OF TRADE has granted the necessary building licences for a brassfoundry and light engineering factory at Bethesda, the well-known slate-quarrying centre in Caernarvonshire. Cooper, Webb-Jones & Company, of Walsall, have purchased four acres of land on which they propose to erect their foundry and factory, which will produce brass materials and light engineering parts.

THE MONTHLY INFORMATION SHEET for July, published by the British Standards Institution, of 28, Victoria Street, Westminster, London, S.W.1, includes among amendment slips issued No. PD 523, 1189:1944, cast-iron baths for domestic purposes. Among new work started the list includes weld test-pieces suitable for radiographic examination; nomenclature, definitions and symbols for welding and cutting (revision of B.S. 499); nickel alloy castings, and the determination of nickel and aluminium in permanent magnetic alloys.

THE INDUSTRIAL COURT, under an award issued on September 17, has rejected a claim for an increase in wages of employees in blast-furnace plants. The National Union of Blastfurnacemen, Ore Miners, Coke Workers and Kindred Trades had claimed an increase of 2s. a shift in basic rates of all adult male labour employed at the blast-furnace plants of the members of the Iron and Steel Trades Employers' Association. The employers contended that the cost-of-living scales negotiated nationally made adequate provision for changes in the general level of wages. They also said that any further increase would have serious repercussions on a very much larger number of other workers throughout the iron and steel industries.

THE OPINION THAT the rehabilitation of Central Scotland should take precedence over the creation of new townships was expressed by the Earl of Selkirk at a conference in Glasgow, when he commended the efforts of Lanarkshire Sixth District Industrial Association to attract new industries to the area and provide a greater variety of employment. He pointed out that, extending from Uddingston to Newhouse, the district covered an area of approximately 58 square miles, with a population of between 50,000 and 60,000 people. What the district was able to produce would be seen at an exhibition in the Miners' Welfare Institute, Bellshill, which the Joint Under-Secretary of State for Scotland, Mr. Tom Fraser, M.P., would formally open.

OBITUARY

SIR GEORGE HUME, who died recently, aged 81, was a director of Siemens Bros. & Company, Limited.

MR. FREDERICK HENRY REAKES LAVENDER, managing director of Voucher, Limited, machine-tool makers, of Walsall, died recently, aged 58.

MR. HARRY EDWIN HARRIS, who died on September 22 at the age of 60, was a local director of Platt Bros. & Company, Limited, textile and general engineers, of Oldham.

MR. GERALD HENRY ADOLPHUS SINGTON, chairman of the Textile Machinery and Accessories Industrial and Export Group, died suddenly on September 22, at the age of 69. He was chairman of Adolphus Sington & Company, Limited, and a director of Textile Machinery Makers, Limited, Platt Bros. & Company, Limited, and Taylor, Wordsworth & Company, Limited. Mr. Sington was the author of a number of books on cotton-spinning machinery.

SIR WILLIAM ASHBEE TRITTON, who was knighted in 1917 for his part in the invention and development of the tank, died last week at the age of 71. He joined the firm of Gwynne's Pumps, Limited, in 1891, but left first to become a gold and silver analyst, and later an inspector of rails and steel sleepers. Some 40 years ago Sir William joined William Foster & Company, Limited, agricultural and traction engineers, iron and brass founders, of Lincoln. He became managing director of the company in 1911 and chairman in 1939. During the earlier part of the 1939-45 war he was employed as adviser by the Ministry of Supply.

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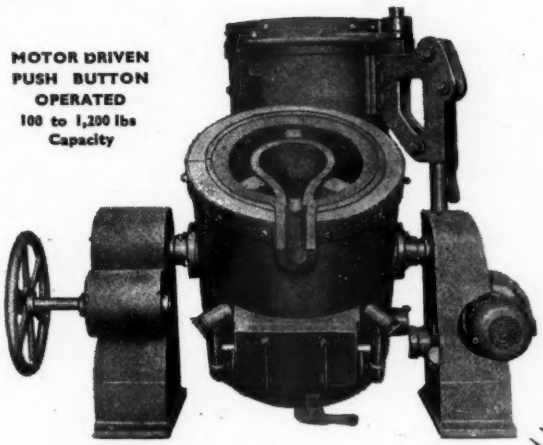

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COMPANY RESULTS

(Figures for previous year in brackets.)

Vickers—Interim dividend of 4% (same).

Vab Products—Interim dividend of 5% (same).

Superheater Company—Interim dividend of 15% (same).

Stothert & Pitt—Dividend of 10% and a bonus of 5% (same).

Dubilier Condenser Company (1925)—Dividend of 20% (same).

Churchill Machine Tool Company—Interim dividend of 15% (same).

Thos. Firth & John Brown—Interim dividend of 2½% (3%), tax free.

W. T. Henley's Telegraph Works Company—Interim dividend of 5% (same).

Murex—Final dividend of 10% and a cash bonus of 2½%, making 20% (same).

Aston Construction Company—No dividend on the 7% preference shares (same).

British United Shoe Machinery Company—Interim dividend of 6%, tax free (same).

John Wallace & Sons—Final dividend of 10%, less tax (5%, tax free), making 15%, less tax (5%, tax free).

Renold & Coventry Chain Company—Final dividend of 9½% (7%), making 12½% (10%) and a bonus of 2½% (same).

Peter Brotherhood—Net profit, after tax, for the year ended March 31, £28,905 (£33,210); dividend of 20% (same); forward, £145,976 (£140,859).

Engineering & Lighting Equipment Company—Net profit, after taxation, deferred repairs, etc., for the year ended March 31, £13,308 (£21,357); final dividend of forward, £2,571 (£1,553).

Matthew Hall & Company—Net profit for 1945, after crediting settlement of claims for additional costs relating to previous years, £16,162 (£12,615); dividend of 25% (10%); forward, £9,724 (£1,813).

Smethwick Drop Forgings—Net profit for the year ended March 31, including £31,000 (nil), net E.P.T. repayable, and after income-tax, £38,030 (£38,952); dividend of 12½% (20%), making 25% (32½%).

Wm. Neill & Son (St. Helens)—Net profit for the year ended March 31, £45,759 (£66,487); taxation, £32,000 (£47,000); deferred repairs, nil (£13,000); dividend of 5d. per share (3½d.); forward, £13,181 (£8,589).

Irish Steel—Loss, £69,517 (profit £39,353), after providing for administrative and overhead expenses, but before providing for trade loan redemption and other items); income-tax recoverable, £15,776; provision for Bessemer converter (less expenditure) not now required, £8,318; amount provided for trade loan redemption, £11,111; forward, £132,317 (£76,175).

Briton Ferry Steel Company—Net profit for the year ended March 30, after providing £66,000 (£74,173) for taxation and £10,736 for Victory bonus to employees, £57,826 (£84,646); reserve not now required, £1,000; reserve for modernisation and contingencies, £30,488 (£55,000 to improvements, etc.); interim dividends of 2½% and 7½%, making 10% (same), no further dividend being recommended; forward, £54,916 (£53,841).

PERSONAL

MR. S. C. SEWARD has resigned from the board of Wellworthy Piston Rings, Limited.

MR. ERIC WARD, fuel engineer with the Consett Iron Company, Limited, has been appointed assistant works production manager to the company.

MR. JOHN MCLAREN, a director and secretary of Cruikshank & Company, Limited, iron and steel founders, of Denny, Stirlingshire, and Mrs. McLaren, have recently celebrated their golden wedding. Mr. McLaren entered the employment of the company 55 years ago.

MR. THOMAS CROSBY has decided not to offer himself for re-election as a director of the Briton Ferry Steel Company, Limited. He has been intimately connected with their works for many years, first in a managerial capacity. Mr. Crosby will remain a director of two of their subsidiary companies.

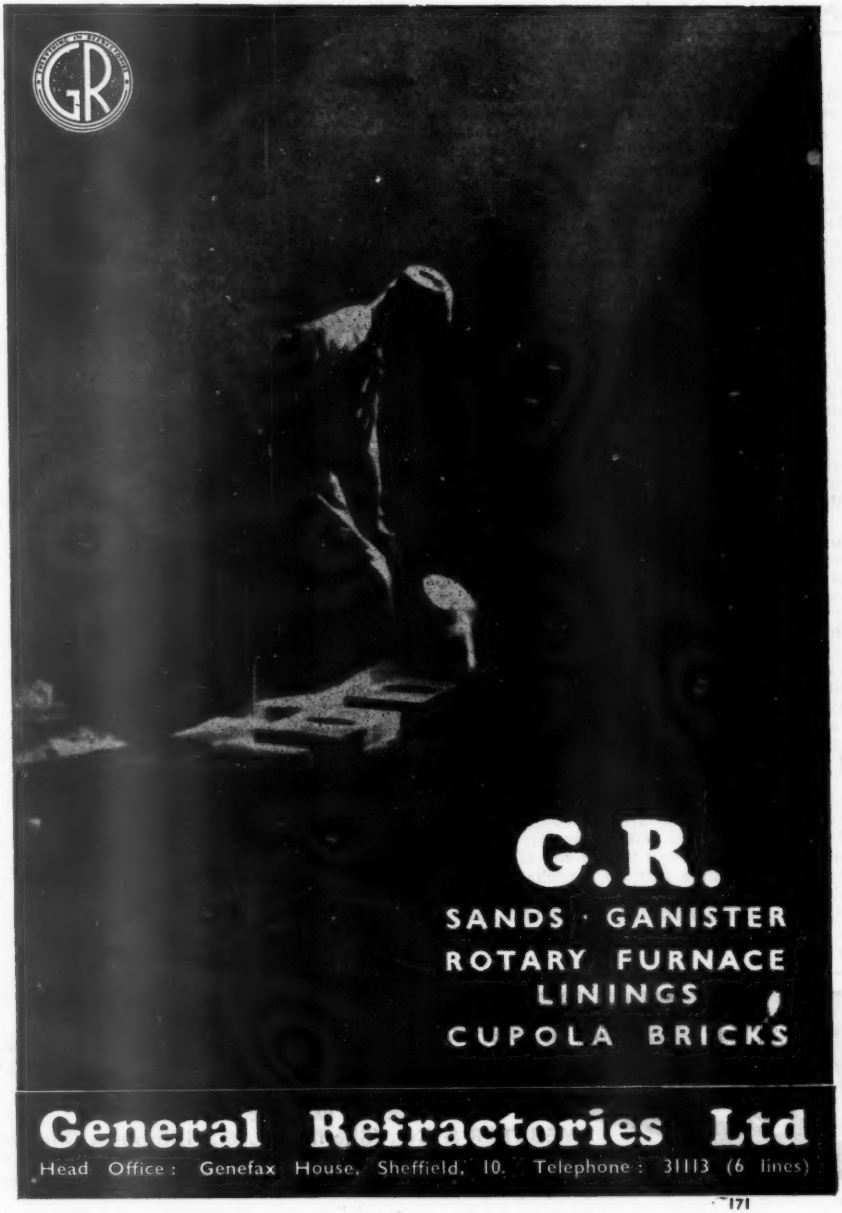
MR. J. B. PEARSON, after 25 years as managing director of Cowans, Sheldon & Company, Limited, crane makers, etc., of Carlisle, is retiring from that position at the end of the year. He will continue as chairman. MR. P. B. TUCKER, who is on the London staff of the firm, is to succeed Mr. Pearson as managing director.

MR. L. B. ROBINSON has been appointed managing director of the Zinc Corporation, Limited, jointly with Mr. W. S. Robinson, and managing director of New Broken Hill Consolidated. In order to take up these appointments he has resigned his position of joint managing director of the Imperial Smelting Corporation, Limited.

MR. W. C. FAHIE has been appointed head of the instrument section in the physics department of the British Iron and Steel Research Association. He took a degree in experimental and mathematical physics at University College, Dublin, where he later carried out research on the electrical measurement of short-time intervals, band spectrum analysis and various applications of thermionic devices.

Wills

MATHER, RICHARD, of Buxton, retired tool manufacturer	£3,261
BLYDE, J. E. A., of A. Blyde & Company, Wallace Steel Works, Sheffield	£27,027
HARTLEY, JOHNSON, for many years a director and secretary of John Mitchell & Company (Halifax), Limited, manufacturers of engineers' and machine tools	£4,697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Raw Material Markets

IRON AND STEEL

Pig-iron production is approximately equated to current needs. In the strenuous efforts now being made to step up the output of light castings for the building trade there are latent possibilities of much heavier demands for high-phosphorus iron which could only be met by increasing the number of blast furnaces in operation. At present, foundries are not permitted to buy for the replenishment of stocks, but they are getting supplies adequate for current needs. The call for hematite, low- and medium-phosphorus iron, and also for ferro-manganese, is on a rising scale, but refined iron is readily obtainable and a few export licences have been issued.

There are now better prospects in regard to the supplies of re-rolling material. As a result of the American loan purchases of sheet bars and billets from the United States have been negotiated and distribution of the first cargoes to arrive is now proceeding. These imports are most timely, since the deficiencies in deliveries from the English and Welsh steelworks were already creating embarrassments at the re-rolling mills. Of course, it is costly material, but the necessity of keeping the mills supplied is an over-riding consideration.

Distribution of maximum outputs of steel plates has to be very carefully planned to ensure regularity of operations in essential industries. There are occasional complaints of delay, but, on the whole, the system of controlled distribution is working smoothly. The extent of the demand from home sources is, however, impressive, and it is scarcely probable that the curtailment of exports in the closing months of the year can be avoided. A much stronger market for heavy joists and sections is a reflection of the progress of reconstruction work, while the capacity of the rail mills is fully extended to cope with the weight of orders in hand. Light sections are wanted in increased quantities, and the strength of the demand for wire is unimpaired. For black and galvanised sheets so many orders have been placed, or are on offer, that the position has become chaotic and it transpires that all orders which are not completed by the end of October are to be reviewed. There may be cancellations, but some such measure was plainly needed to assure essential supplies for important industries and to establish some sort of order out of the existing scramble for supplies.

NON-FERROUS METALS

After a long period of delay, the Ministry of Supply has announced new selling and buying prices for tin, the higher levels coming into operation on September 26. The basic price of tin metal sold by the Non-ferrous Metals Directorate for delivery in the United Kingdom is increased from £300 to £380 10s. per ton, while the basic price of tin metal sold f.o.b. U.K. port for export from the U.K. is increased from £357 to £380 10s. The basic price is for metal of minimum 99 per cent. to 99.75 per cent. tin content, and prices for all other grades will be varied correspondingly.

Holders of valid licences to purchase tin for delivery in the U.K. or for export from the U.K. granted on or before September 25 may, on application to the Directorate at 20, Albert Street, Rugby, cover themselves by purchases where they have not already done so against such licences up to and including October 9 at the Directorate's selling price ruling on September 25. The selling price of Straits tin for export has been raised from £351 to £372 per ton ex works Penang/Singapore.

Settlement has now been reached on the purchase price to be paid by the Ministry of Supply for tin concentrates in Malaya, Nigeria and East Africa. In the case of Nigeria, where the costed contracts with the main producers were terminated at the end of 1945, the price for the first half of 1946 has been fixed at £340 per ton of tin in ore, f.a.s. Nigerian port, and for the second half of 1946 at £357 10s. per ton of tin in ore, f.a.s. Nigerian port (the Ministry paying ocean freight and insurance and smelting charges). The prices paid in East Africa will be adjusted generally to the new Nigerian levels. In the case of Malayan concentrates the basic tin price from July 1, 1946, is £370 a ton at Penang/Singapore smelters. These purchase prices represent substantial increases in each area, and bring the various prices (after allowing for freights, etc.) into general relationship.

The upgrading of tin prices has been generally welcomed. The tin section of the Singapore share market was more active following the announcement of the 23 per cent. increase in price for Malayan tin. Only about 10 per cent. of the tin industry will benefit at present as the great majority of the dredges are not yet working.

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